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AMERICAN ACADEMY of OPHTHALMOLOGY and OTOLARYNGOLOGY

MAY - JUNE
1961

Volume 65 Number 3

ANNUAL MEETING, OCTOBER 8-13, 1961, CHICAGO

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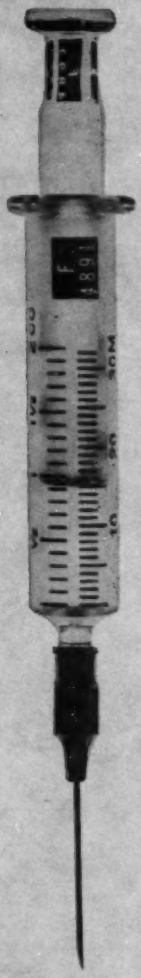

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References: 1. Sadove, M. S., and Wessinger, O. D.: **J. Internat. Coll. Surgeons** 34:573, Nov., 1960. **2.** Erickson, J. C., III, and Hricko. M. J.: **Guthrie Clin. Bull.** 29:45, 1959. **3.** Gordon, R. A.; Kerr, J. H., and Taylor, Russell: **Canada. Anaesth. Soc. J.** 7:290, July, 1960. **4.** Sadove, M. S.: **New Physician** 9:39, Sept., 1960. **5.** Young, J. A.: **Anesth. & Analg.** 39:451, Sept.-Oct., 1960.

*If desired, epinephrine may be used in infiltration anesthesia for hemostasis.

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American Academy of Ophthalmology and Otolaryngology

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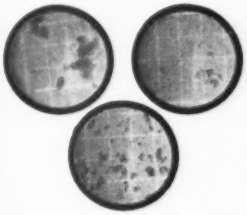
THERE ARE DIFFERENCES IN STEROID PREPARATIONS FOR THE EYE

IN THE SUSPENSION



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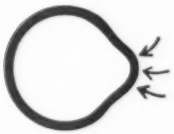

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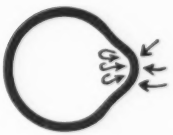

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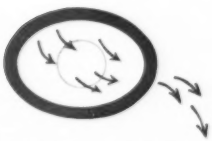

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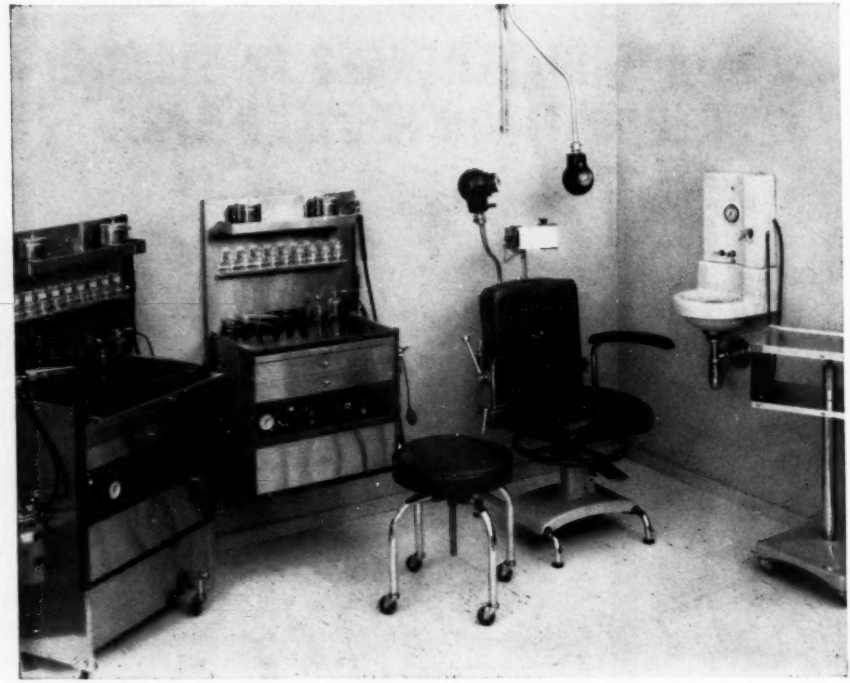

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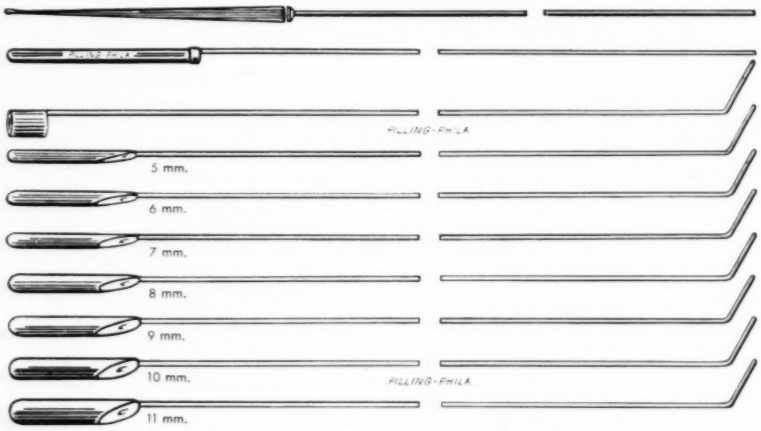

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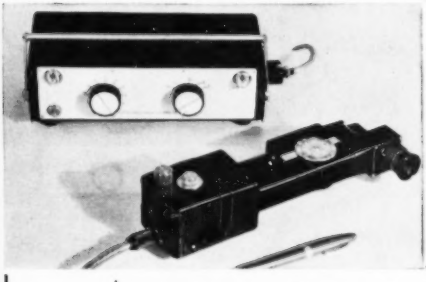

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References: (1) Perkins, E. S.: *Practitioner* **178**:575, 1957. (2) Queries and Minor Notes: *J.A.M.A.* **161**:1032, 1956. (3) Fisher, M. W.: *Arch. Int. Med.* **105**: 413, 1960. (4) Smith, C. H.: *Eye, Ear, Nose & Throat Month.* **34**:580, 1955.

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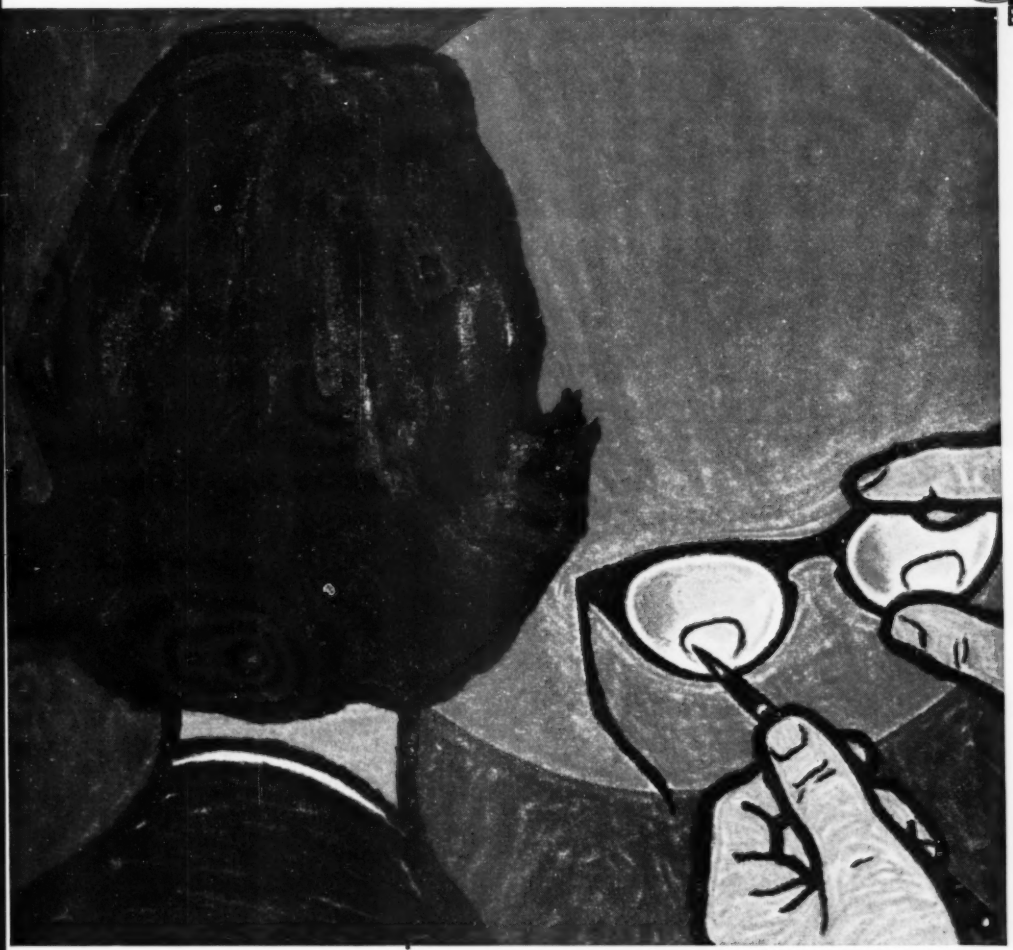

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CANCER OF THE NASOPHARYNX: Its Natural History and Treatment by **M. Lederman,** Royal Marsden Hospital. Of interest to all concerned in the diagnosis and treatment of malignant diseases of the head and neck. Contents: The Clinical Material; The Anatomy of the Nasopharynx in Relation to the Origin and Spread of Cancer; Mode of Spread of Nasopharyngeal Cancer in Relation to Presenting Symptoms; Pain as a Symptom in Nasopharyngeal Cancer; Radiological Appearances; Histology and Pathology, Treatment Principles; Radiotherapy Techniques; Complications of Radiotherapy and Their Prevention; Results of Treatment. **Pub May '61 (Amer. Lec. Radiation Therapy), 128 pp., 109 il., $6.75**

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NEURAL MECHANISMS OF THE AUDITORY AND VESTIBULAR SYSTEMS, edited by **Grant L. Rasmussen** and **William F. Windle,** both of the National Institute of Neurological Diseases and Blindness, Bethesda, Maryland. This conference represents the tenth in a series of such meetings called by the National Institute and designed to provide stimulus and encouragement in an important field of research. Publication of the proceedings provides a unique and stimulating exchange of knowledge between thirty-two scientists throughout the world who have a common interest in the ear and its mechanisms. **Pub. Feb. '61,** 436 pp. (6¾ x 9¾), 433 il., $15.75

GENETICS AND OPHTHALMOLOGY by **P. J. Waardenburg,** Univ. of Utrecht and Leyden; **A. Franceschetti** and **D. Klein,** both of Univ. of Geneva. It is many years since the plan was conceived to publish a work embodying the latest developments in the field of ophthalmogenetics. Partial contents of this unique atlas includes: Genetics and the Human Eye; Eyebrows and Eyelids; Affections of the Conjunctiva Palpebrae et Bulbi; Lacrimal Apparatus; Orbital and Inter-Orbital Region; Eye, Orbital Region and Face; Anomalies of Presumably Peripheral Origin of the Extra-Ocular Muscles; Cornea; Sclera; The Anterior Chamber; Uveal Membrane; The Lens; Congenital Anomalies of the Shape and Site of the Lens; The Vitreous Body. **Pub. June '61, 1040 pp., 650 il. (with 60 pages in full color), 340 diagrams**

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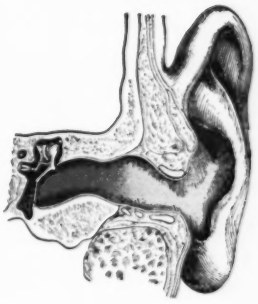

1 'AEROSPORIN'® brand Otic Solution

Comprehensive bactericidal/antifungal action – eradicates *Pseudomonas* and most other common causes of otitis. Hygroscopic; restores normal acid mantle.

Each cc. contains:
'Aerosporin' brand Polymyxin B Sulfate ..... 10,000 Units
Acetic acid 1%
Propylene Glycol q.s. Sterile
Available in dropper bottles of 10 cc.

2 'CORTISPORIN'® brand Otic Drops

Broad-spectrum bactericidal action plus effective anti-inflammatory and antipruritic therapy. Eradicates most common causes of otitis; restores normal acid mantle.

Each cc. contains:
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Hydrocortisone in a sterile, slightly acid, aqueous suspension ..... 10 mg.
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Acts quickly to relieve pain and itching associated with otitis externa. Bactericidal/antifungal action – eradicates *Pseudomonas* and most other common causes of otitis. Hygroscopic; restores normal acid mantle.

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Literature available on request.

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Shuron

A paper written by Roy Marks, President of Shuron Optical Company, was presented to the Academy of Optometry in December of last year on the subject of children's eyewear. The paper presented a study which was used by Shuron as the basis for the design of a completely new line of children's frames. These frames, soon to be marketed, are called Pedioptic Frames. The study revealed strong criticisms of present frames for children. Because of the importance of this subject, we are devoting this month's "Shuron Report" to an article by Mr. Marks.

ARE WE DOING ENOUGH for CHILDREN?

The "population explosion" talked about in newspapers, books and magazines is a very real fact in this country. And—as those concerned with the overcrowding of schools, for example, are only too well aware—the "explosion" means a substantial jump in the child population, both in total percentage and in absolute numbers.

Are we, as an industry, doing enough for these children? The answer—surprising and unflattering—is a resounding "No."

You may have read or heard about the recently announced extensive 2-year research programs, carried out by Shuron, on the subject of children's eyewear. This research made it very clear to us that today's frames for children fall deplorably short in the areas of sound design and structure. It furnished us with both motivation and opportunity to take a major step in fulfilling the discovered needs.

When we first decided to bring out a totally new line of children's frames, we were determined to do it on a scientific basis . . . to discover, with modern sampling methods:

1. Whether there was a need for a complete new design concept. 2. Why present frames were inadequate. 3. How they could be improved.

To carry out this part of the study, practitioners and suppliers in 12 major cities were interviewed, and parental attitudes towards children's eyewear were widely sampled at the world-famous Corning Research Center.

This fact emerged: We, as an industry, have done little or nothing—on a factual, scientific basis—to furnish the proper frames for the millions of children who need visual help. True, we're offered many scaled-down versions of adult frames; inverted the pads, taken steps to strengthen bridge and temple areas. But, as shown by the almost overwhelming verdict of both practitioners and parents, children's are still *far* from satisfactory . . . because, in general, they simply *do not fit!*

Report:

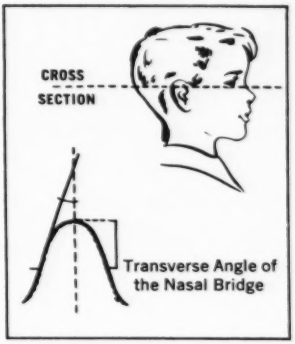
Since a good indication of this became evident very early in our study, we were convinced that something more was needed on which to base our frame designs: Actual anthropometric data on the shape and development of children's faces. We expected to find published research data, with results that we could interpret. Here was the surprise: *No such study* had ever been made! To get this information, we had to do the complete job. For this reason, the study required a full two years of intensive research.

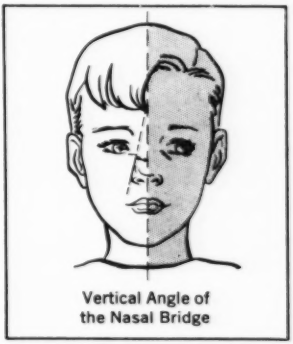
We enlisted, first of all, the skillful cooperation of a renowned anthropologist at Columbia's College of Physicians and Surgeons. His aid was invaluable in setting up the study and in its subsequent completion . . . even to the extent of inventing a new measuring device for the purpose!

As a result of this data-gathering, Shuron now literally possesses the only set of scientific facts on the developmental changes, in two-year age groups, that occur as a result of the growth of the bony structure of the bridge of the nose and the orbital structure surrounding it. It was firmly established that children are *not* miniature adults; that there are definite differences in the bridge area, and that the most significant dimension is the transverse angle of the nasal bridge.

Somewhat surprisingly, the vertical angle of the nose—previously considered the important one—was found to remain practically constant through all periods of growth. Here again, research proved invaluable, in this case showing what is *not* so, even though it was previously acecpted as an obvious and general fact.

The next step was to translate the new data into frames. Shuron design engineers have done so. The new line is appropriately named **Shuron Pedioptic Frames.** The new bridge design, which accurately reflects the changes that occur as the child grows and matures, is called the ***Youthform*** Bridge.





Pedioptic frames are attractively styled, are available in carefully chosen colors, have been judiciously strengthened, and reflect traditional Shuron quality and attention to detail. But other manufacturers can make similar claims about their frame. Where, then, is the difference? The difference lies in the fact that Pedioptic frames are designed to fit children . . . real living, growing children . . . as they actually are, not as someone thinks they are.

I have taken this opportunity to discuss Shuron's answer to a tremendous need, and to tell you of some of the background of this dramatic new line of children's eyewear. Pedioptic Frames will be available to you very soon. I suggest, respectfully, that they present a wonderful opportunity to you . . . and to the children who are your patients.

Keep Abreast of Shuron news and products by watching for "Shuron Report" in this publication.

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6

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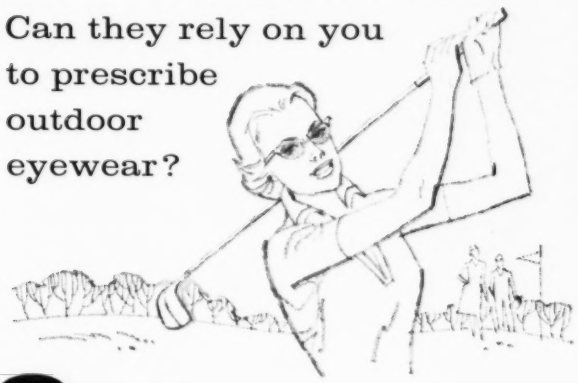

IF NOT, the alternative is clear. They'll be making impulse, spur-of-the-moment purchases from clerk-dispensed or self-serve racks and displays. Absent will be the important considerations of professional eye care, an up-to-date prescription, Rx-ground lenses, personal selection, proper fitting and continuing service. Give your patients the benefit of your *professional* service.

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Complete literature available on request to physicians for indications, dosages and precautions.

References: 1. Gordon, D. M., and Ehrenberg, M. H.: *Am. J. Ophth. 38*:831, 1954. 2. Prangen, A. De H.: *A.M.A. Arch. Ophth. 18*:432, 1937. 3. Ehrlich, L. H.: *New York J. Med. 53*:3015 (Dec. 15) 1953. 4. Miles, P. W.: *Missouri Med. 56*:1243, 1959. 5. Leopold, I. H.: in Abstract of Discussion: *A.M.A. Arch. Ophth. 51*:471 (April) 1954.

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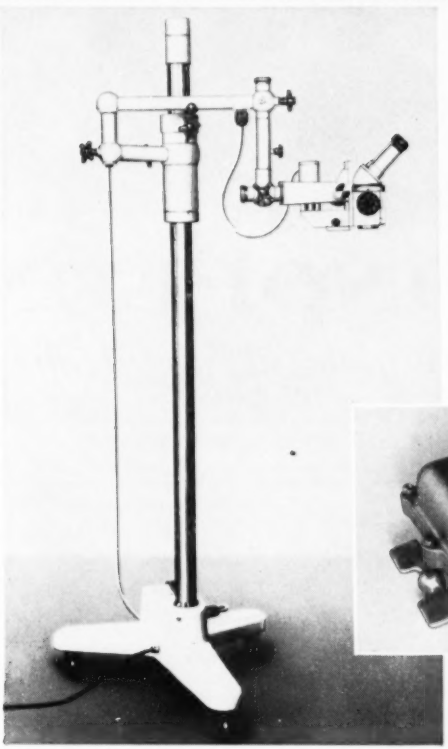
Surgical Instruments



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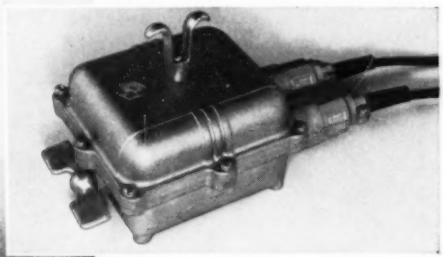

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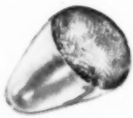
Stock eyes	Custom eyes	AO Buried Mesh (Lemoine)	Hollow Buried (Bonaccolto)	 Hollow cone (Berens)
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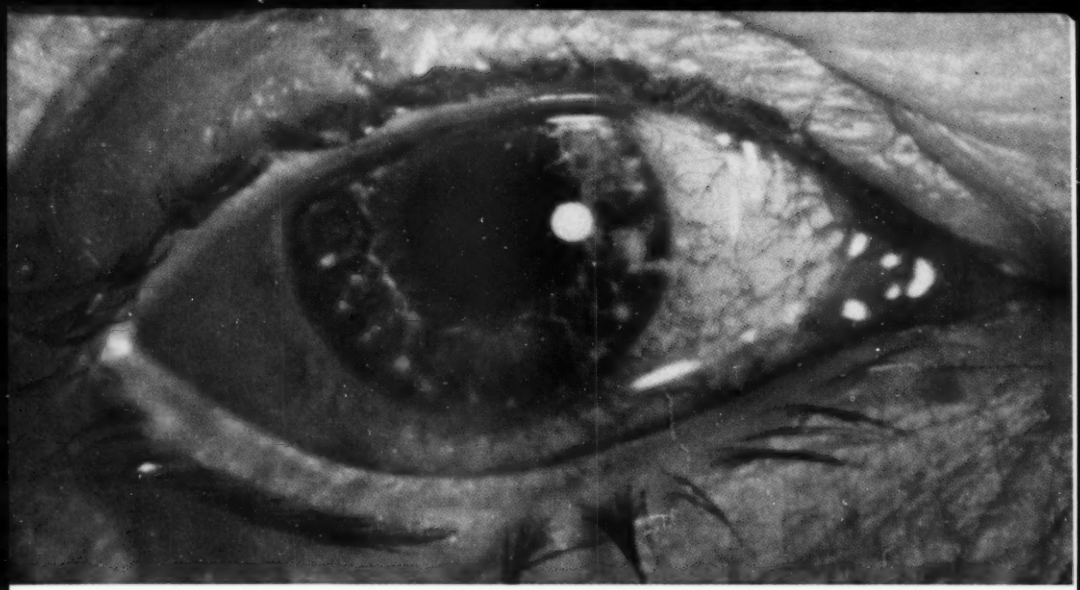

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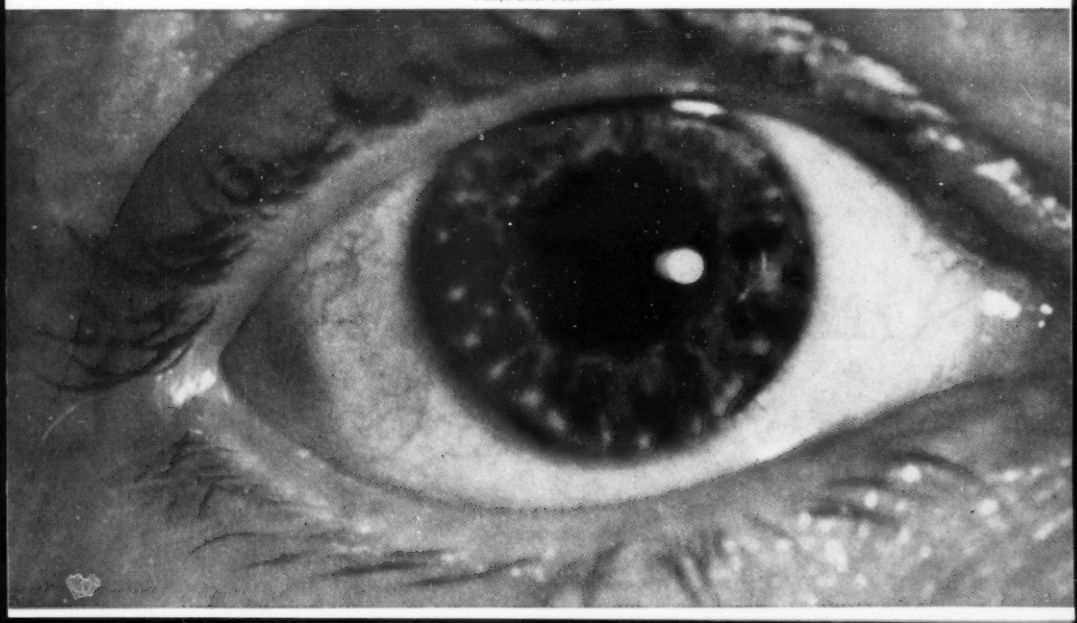

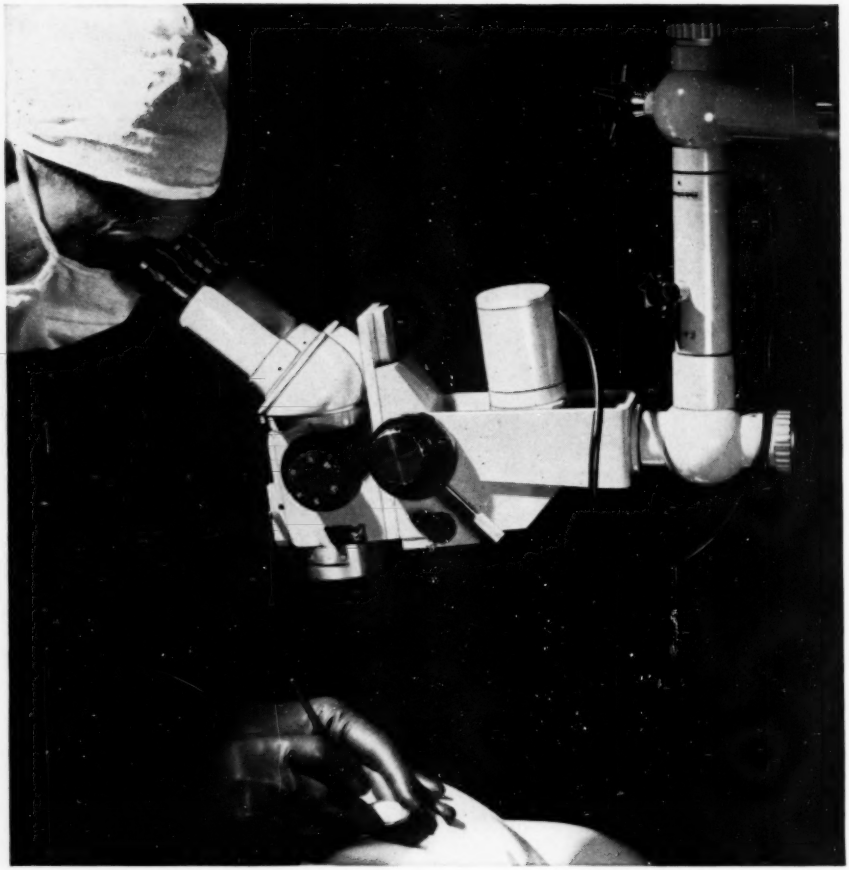

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References: (1) Morrison, W. H.: *Nebraska M. J.* **45**:106, 1960. (2) Perkins, E. S.: *Practitioner* **178**:575, 1957. (3) Tassman, W. S.: *U. S. Armed Forces M. J.* **10**:161, 1959. (4) Kamiya, S.: *Am. J. Ophth.* **42**:269, 1956. (5) Holland, R. W. B.: *Arch. Ophth.* **57**:214, 1957. (6) Benton, C. D., Jr.: *South M. J.* **51**:1562, 1958. (7) Blakiston's New Gould Medical Dictionary, ed. 2, New York, McGraw-Hill Book Company, Inc., 1956, p. 945. (8) Ostler, H. B., & Braley, A. E.: *J. Iowa M. Soc.* **44**:427, 1954.

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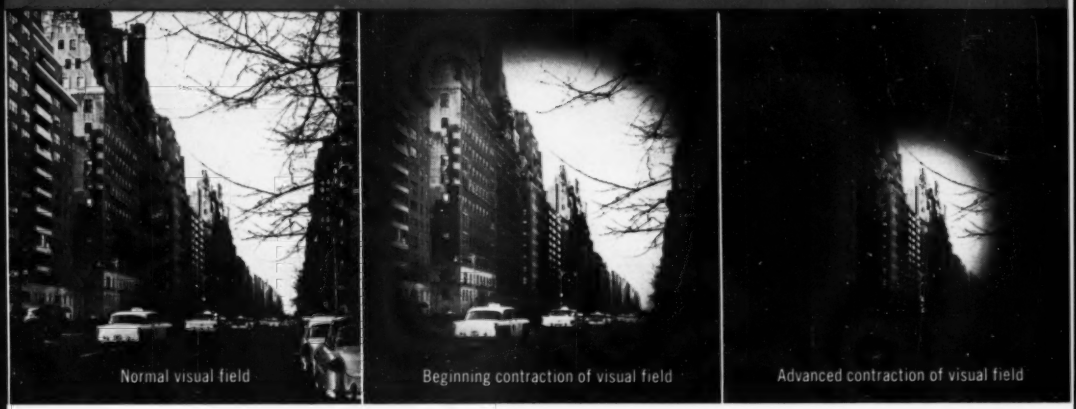

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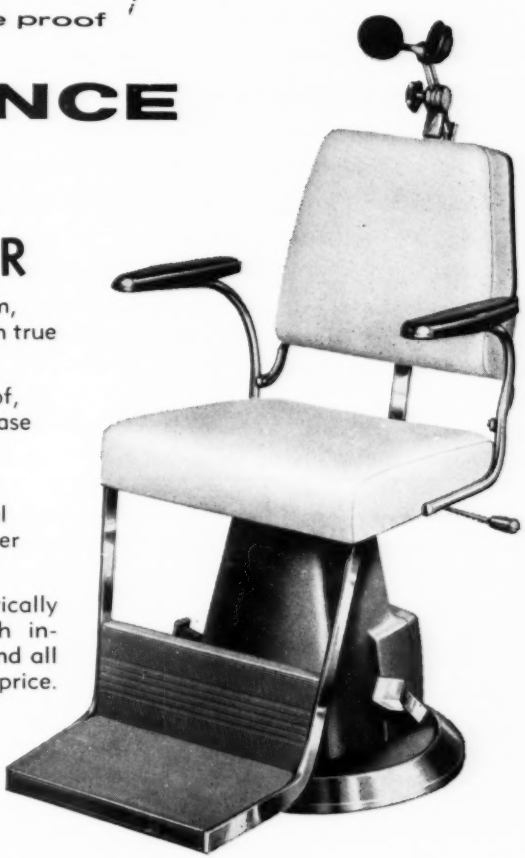

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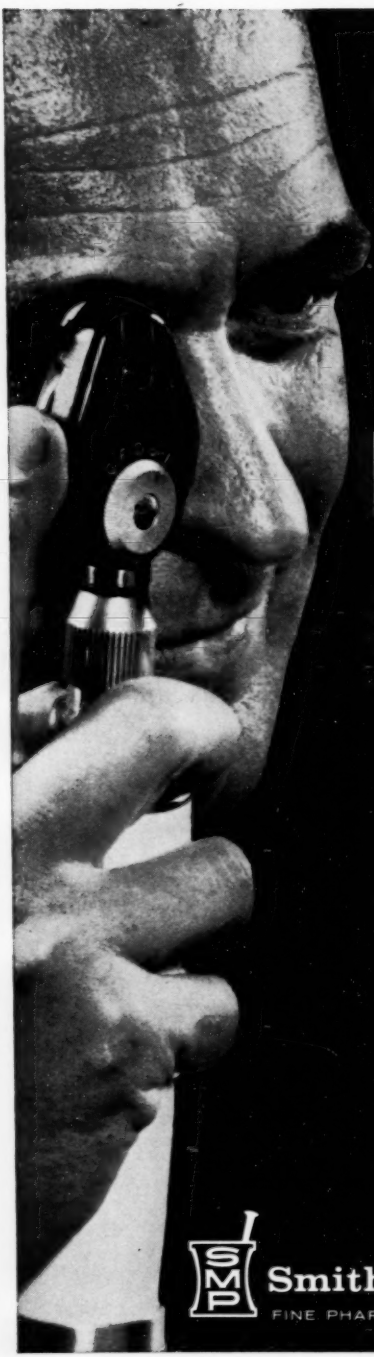

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NERVE DEAFNESS AND BRAIN TUMORS

VICTOR GOODHILL, M.D.

LOS ANGELES, CALIFORNIA

AT a meeting traditionally devoted to conservation of hearing, it may be shocking to realize that in our pursuit of hearing conservation we may well forget that it is also our responsibility as otologists to conserve human life itself.

A quarter of a century ago, the stormy saga of intracranial suppurations well behind us, we otologists conveniently climbed into the secure sclerotic confines of the otic capsule to delve with ingenious microscopy into the varied anatomical crevices of the temporal petrosa. With occasional embarrassing exceptions, we thought we had left behind the lurid past of intracranial complications and could now confine ourselves to the orthopedic problems of the middle ear and to the labyrinthine windows.

Every patient with a nonconductive hearing loss, with or without tinnitus and/or vertigo, finds himself in the category of "nerve deafness." The usual clinical concept places nerve deafness in the cochlea. Although we are all aware of eighth nerve tumors and quickly call for neurological consultation when confronted by sensorineural deafness and facial paralysis, how often do we really consider the possibility of an intracranial lesion in the patient who shows nothing more than "simple nerve deafness"?

In recent years, audiologists as well as otologists have been attempting to devise diagnostic methods to distinguish retrocochlear lesions from cochlear lesions. Thus we have seen the refinement of the Bekesy[1] audiometer, the development of the distorted speech tests by Bocca[2] and others, the SISI test of Jerger,[6] the intriguing binaural studies of Matzker,[7] adaptation methodology, tone decay tests and similar audiologic developments.

In the field of vestibular phenomena, there has always been a great interest, although principally among our European colleagues. Developments in nystagmography, cupulometry and other techniques have been carried out in close cooperation with neurologists, and the scope of neuro-otology is commanding greater interest all of the time.

However, the possibility that nerve deafness is frequently retrocochlear in origin is not widely appreciated. This is not only true in the field of neoplasms, but it is also true in many cases of "nerve deafness" in children, in which the lesions are primarily in the brain stem and in the higher cerebral pathways.

It is awesome to realize that the otologist may be the only one who can make a diagnosis of a brain tumor early enough to spare a patient's life. All too frequently, the only symptoms are oto-

From the Los Angeles Otosurgical Group, and the Departments of Otolaryngology, Cedars of Lebanon Hospital, Childrens Hospital and the University of Southern California.

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logic and the patient would have no reason to consult another physician. If the otologist does not constantly bear in mind the possibility that his patient with nerve deafness may have a lesion central to the cochlea, possibly in the cerebellopontile angle, referral for appropriate therapy may not be made in time to save his life.

Many years ago Cushing[3] very ably delineated the clinical story of the acoustic neuroma and stressed many aspects relating to the diagnosis of this lesion, a number of which are otologic. Unfortunately, frequent cases appear which do not fall into these neat diagnostic categories and which can trap the unwary otologist who enjoys a false sense of security. It is, of course, not the otologist who is really trapped, but the unfortunate patient. To emphasize the need for an awareness of this problem, I should like to illustrate my point with three case reports.

CASE REPORTS

Case 1:

A 54-year-old man was first seen in 1954 with a history of complete left nerve deafness since infancy. During his entire lifetime he had had normal hearing in the right ear. He had been well except for an episode of severe actinomycosis of the right mandible and maxilla twenty years previously, as a result of which he had multiple facial scars and some right facial deformity. His only reason for seeing us otologically was tinnitus in the right ear.

Examination revealed complete left anacusis (nerve deafness) and a very slight right high-frequency sensorineural hypacusis with excellent hearing in the low frequencies. Since he was a printer and was exposed to much acoustic trauma produced by printing presses, it was assumed that he had beginning high frequency neural loss in the right ear due to acoustic trauma. No specific therapy was advised, but he was asked to return for further studies in several months.

He returned six months later with a new complaint of mild episodes of "dizziness," sometimes accentuated by positional change. The possibility of mild labyrinthine hydrops was considered, and dehydration therapy led to a complete disappearance of the vertigo. There was no change in the hearing level. Several months later he returned complaining only of an increase in hearing loss. There was no vertigo. Since examination now showed a sensorineural drop to the 37-decibel level, it was assumed that we were dealing with a degenerative cochlear process, probably similar to that which had occurred earlier in the left ear. A hearing aid was suggested, and because of the remote possibility of a neuroma, roentgenographic study was advised. The patient, however, did not return for further advise along either line.

The patient came in again four years later. In the interim he had purchased a hearing aid and now sought audiologic assistance in regard to it. Examination at this time showed a further right sensorineural drop in hearing level. He had no other complaints or findings. Since four years had elapsed and since the only presenting finding was a further sensorineural loss, the previous impression of degenerative cochlear deafness seemed reasonable and no further studies were made. The previous advice regarding roentgenographic studies seemed unnecessary.

During the next year (1959), however, he returned on several occasions, each time with evidence of further sensorineural hearing loss. A more powerful hearing aid was suggested, along with advice for lip reading instruction.

He returned in March 1960, complaining of still further deterioration of hearing in the right ear. He was having great difficulty even with a powerful hearing aid. There was no vertigo, and tinnitus had disappeared. Caloric vestibular studies done at this time revealed no response to stimulation with massive douching on the right and slightly diminished responses on the left. Fibrillary twitchings of the right facial muscles were noted, but there was no evidence of any facial nerve weakness. Roentgenograms of the internal auditory meatus regions were again advised and a neurosurgical consultation was suggested.

Roentgenograms revealed a greatly enlarged right porus acousticus. Neurosurgical examination was postponed by the patient for two months, by which time he showed a right peripheral facial paralysis and marked decrease in taste in the entire right half of the tongue, but there were no other neurological

findings. The neurosurgical diagnosis was that of right acoustic neuroma. Surgical exploration was advised and was followed by removal of an enormous acoustic neuroma, producing complete pressure atrophy of the seventh and eighth nerves. Facial hypoglossal repair was not considered advisable because of the actinomycotic scars but a sling operation was finally decided upon.

Critical review of the above case history reveals innumerable opportunities for otologic self scrutiny. In retrospect, caloric studies should have been done years before, along with roentgenographic and recruitment studies. We should not have assumed that we were dealing with a degenerative process similar to that in the left ear. The left nerve deafness in this case was purely a "red herring" and probably had no relationship to the right acoustic neuroma. Too often we assume that the pathologic process in one ear must necessarily be etiologically the same as in the other. While this is usually true, it is untrue frequently enough to create the constant necessity for diagnostic alertness.

The patient in the next case history came to us with findings which could have been attributed either to so-called pseudo-Ménière's disease or to degenerative cochlear deafness based on a past history of contralateral deafness. The fact that no neurologic abnormality appeared over a four-year period was further diagnostic sedation lulling the otologist into the comfortable security and the mistaken impression of peripheral nerve deafness.

Case 2:

This patient, a 40-year-old man, had a known right hearing loss with gradual progression since the age of 34. He had normal hearing in the left ear. He consulted an otolaryngologist, who made a diagnosis of right otosclerosis and advised a stapes mobilization operation. Another otolaryngologist questioned this diagnosis and advised further consultation.

Several months later he consulted us. He still had only one complaint, namely, right deafness. He had noted slight tinnitus six years before at the onset of his hearing loss, but this had disappeared. He had no vertigo, no headaches; in short, no other complaints.

Examination revealed a right sensorineural loss of 72 decibels in the speech range with a 34 per cent speech discrimination score. There was no evidence of a conductive lesion. Vestibular studies revealed normal caloric responses bilaterally. Facial nerve function and corneal reflexes were normal. Since we now routinely ask for roentgenograms of the internal auditory meatus in unilateral nerve deafness, these were made and showed slight widening of the right porus acousticus. Because of this, the patient was advised to have a neurologic examination. In spite of absence of other neurologic findings, the neurologist advised exploration for a possible acoustic neuroma.

At surgery a very large acoustic neurofibroma was found situated lower than such a lesion is usually seen. It enveloped the ninth, tenth and eleventh cranial nerves as well as the seventh and eighth nerves, and was dissected away from these nerves with some difficulty. The erosion of bone was extensive, and it was necessary to section both the seventh and the eighth nerve during the removal of the tumor. A complete removal of the tumor was accomplished and was followed several weeks later by facial-hypoglossal anastomosis, which was quite successful.

This man had only one complaint, namely, that of a hearing loss in the right ear. The hearing loss was mistakenly considered to be due to otosclerosis by a previous otolaryngologist. When we examined this patient, we found what could have been dismissed as a routine "simple" nerve deafness. Since he had normal hearing in the other ear, no significant handicap existed. The diagnosis of an acoustic neuroma in this man was made possible only because of a routine request for a roentgenogram of the internal auditory meatus.

It is very disquieting to realize that only one otologic finding, namely, a right nerve deafness of eight years' duration, was present as the result of an enormous tumor involving the seventh, eighth, ninth, tenth and eleventh cranial nerves!

It is also uncomfortable to realize that lack of competent audiologic methodology resulted in a completely erroneous primary diagnosis of otosclerosis.

Case 3:

This case is a tragic example of unilateral nerve deafness in a 40-year-old man who gave no history of ear trouble but who seemed to have had "the flu" two weeks before we saw him. At the onset his chief complaint was vertigo accompanied by nausea. The nausea was so severe that the internist ordered a complete gastrointestinal roentgenographic study. None of the roentgenograms revealed any abnormality. The patient responded to symptomatic drugs, and a diagnosis of viral labyrinthitis was made by the internist. When we saw the patient in otologic consultation two weeks following the onset of his vertigo, he had only mild left tinnitus and no complaint of hearing loss.

Examination revealed bilateral high frequency neural loss but excellent residual hearing in the speech frequencies. The patient was advised to return in one week for more complete studies. However, he called within three days stating that he had had a recurrence of vertigo with nausea and vomiting and now was aware of a loss of hearing in the left ear.

Upon examination two weeks following the first examination, we found a profound left nerve deafness, with virtually no residual hearing. There was no response to left caloric stimulation, whereas right caloric responses were normal. A definite weakness of the left facial musculature was evident with absence of the left corneal reflex. There was blurring of the disc margins and a positive Romberg test.

In view of these findings, neurosurgical consultation was urged. Unfortunately, exploration was not performed for several weeks. When finally done, an infiltrative glioblastoma multiforme of the brain stem was discovered. The patient expired shortly thereafter.

Here we have a man with a spurious history of so-called "flu" whose entire otologic history prior to exploration was less than one month, during which time he showed evidence of only mild tinnitus at the onset of the violent vertigo, followed by a rather sudden total left nerve deafness within a matter of two weeks following a relatively normal audiogram.

In the three cases cited we see three widely differing examples of nerve deafness problems, differing in characteristics, in time relationships, and in many other facets. Nevertheless, each one of these patients first consulted an otologist for diagnosis and in each case we were dealing with a large brain tumor.

In a number of recent studies of neuromas (Profazio and Ceroni[8]) it appears to be quite clear that unilateral nerve deafness and unilateral absence of vestibular responses may be the only signs of such lesions for many years. However, in many cases the unilateral nerve deafness will precede vestibular changes by many years, as shown in the second case.

The diagnosis of the Ménière syndrome is fraught with great danger. Although there is evidence that recruitment is usually present in a retrocochlear lesion, this is not an undisputed diagnostic criterion. Can we then be completely safe in relying on roentgenograms of the porus acousticus? The answer is, unfortunately, no, since about 20 per cent of such tumors will show no abnormalities in the usual Stenvers and Towne projections. In such cases, vertebral arteriography, ventriculography and tonography may be required for roentgenographic evidence.[4,5]

While spontaneous nystagmus and the absence of corneal reflex are highly suggestive of a central lesion, such findings may be completely absent, as noted for over four years in case 1 and completely in case 2.

The patient with the label of pseudo-Ménière's disease, or the Ménière syndrome, should be kept under long-term surveillance and the possibility that his

symptoms are caused by retrocochlear neoplasm, should not be dismissed until ruled out by appropriate studies. Every case of unilateral nerve deafness deserves a caloric study and a roentgen examination of the porus acousticus region.

Neurosurgeons agree that the operative mortality of angle tumors is still high, possibly 30 per cent, due to damage to the anterior cerebellar artery.[9] Thus early diagnosis and early extirpation are certainly desirable.

Increases in protein content of the cerebrospinal fluid are very frequently present, but absence of such protein changes does not rule out a tumor.

The otologist must come out of his ivory petrous tower and begin to reacquaint himself with the central ramifications of the auditory nerve. He must constantly keep in mind the fact that peripheral symptomatology may very well be retrocochlear in origin and that one can never be quite certain that a given nerve deafness is purely cochlear. The otologist, by virtue of his alertness and awareness of central nervous system lesions, can well make the difference between life and death to the patient. His role should be that of the careful physician who will keep in mind not only the peripheral ear but the entire central nervous system.

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FLUID BARRIERS WITHIN THE OTIC CAPSULE

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As has often been observed, the organ of Corti could not function as efficiently as it does if, like other tissues of the body, it had a direct blood supply with its ever-rushing stream of plasma and cells. The reason is, of course, that this specially adapted sensory structure can detect inconceivably small vibrations. At the threshold of hearing, for the frequency to which the ear is the most sensitive, it has been calculated that the amplitude of movement of the basilar membrane is only 10^{-11} centimeter,[3] which is nearly one hundred thousand times less than the thickness of the membrane that holds a red blood cell together.[9] With this limitation on the movement of the inner ear structures, it is obvious that some system of providing nutrient materials to the sensory areas other than direct blood supply is necessitated. To solve this problem the sensory structures have been surrounded by a fluid which presumably bathes the cells with the proper solution so they can survive and function. This assigns to the fluid a very important role; yet we know less about this fluid than we do about the cells which it provides.

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We know a little about the chemical constituents of the fluid, but not very much. There is no conclusive or even consistent evidence that indicates where or how this fluid originates or its locus of absorption. The role it plays in the electrical activity of the sensory cells and unmyelinated nerve endings is a complete mystery. And of its behavior in disease and of its part in causing some forms of deafness we are thoroughly ignorant. There is, however, an increasing number of publications concerned with these problems, and through the application of recently developed techniques and instrumentation the mysteries may be solved.

The situation is complicated by the fact that there are two fluids in the inner ear. As we review the history of the discovery and delineation of these fluids, we find that the actual barrier membrane separating the two fluids in the cochlea apparently was as hard to find as were the sensory cells themselves. Breschet[4] gives a very comprehensive report covering the theories and discoveries up to 1836. His description is amazing in its completeness and detail considering that his publication appeared fifteen years before Corti[5] and Reissner[18] reported on their research. Breschet reported what was then known about the endolymph and perilymph, which he described as definitely separated in the vestibular labyrinth, but the distinction in the coch-

lea was not so obvious. It was Reissner who finally made it clear that the perilymphatic system almost completely surrounded the endolymphatic fluid, the two being separated by membranous walls.

As we know the situation today, the scala media of the cochlea (bounded by Reissner's membrane, stria vascularis, spiral prominence, external sulcus, basilar membrane, internal sulcus and spiral limbus) contains endolymph and at the basal end connects through the canalis reuniens to the saccule, which then leads to the endolymphatic duct and sac and to the utriculosaccular duct. This cochlear-saccular system is called the *pars inferior* because of its ontogenetic pattern of development. The semicircular canals and utricle form the vestibular portion *(pars superior)* of the system and are also connected to the endolymphatic duct and sac through the utriculosaccular duct.

The perilymphatic-fluid system fills the bony labyrinth, almost completely surrounds the endolymphatic system, and connects directly to the subarachnoid space through the cochlear aqueduct which leaves the bony excavation from the region of the round window. The two fluid systems are therefore distinct and separated by a membranous barrier. A question arises concerning the need for two separate fluids, but there are many problems to solve before this question can be answered. We must first determine the extent and nature of the fluid barrier system. When this complicated determination is made, we should have information about the transport of the monovalent electrolytes and nutrient compounds, not only through the barriers but within the separate fluid systems.

Three types of barrier systems are of concern: the blood-fluid system by which the fluids are created (a special case may be the perilymph-cerebrospinal fluid system), the fluid-blood system by which the catabolic products are removed, and the fluid-fluid system which through cellular membranes keeps the endolymph and perilymph chemically distinct. It is this latter system that concerns us here, particularly that associated with Reissner's membrane.

Two main lines of research have been pursued in connection with the endolymph-perilymph barrier: one concerning the chemical constituents and the other concerning the direction of flow within the separate systems. Experimentally nothing has been done with the selective diffusibility of the barrier systems, but two classes of theories have been proposed that assume certain characteristics of the cochlear barrier.

There are theories that postulate a longitudinal flow of endolymph, that is, along the cochlear duct. Such a theory was initiated by Corti, who suggested that the stria vascularis was the source of endolymph, and it received a great deal of support from the experiments of Guild.[10] Through a small pipette, Guild injected a solution of potassium ferrocyanide and iron-ammonium citrate into the scala media of living guinea pigs. After intervals of from forty-five minutes to forty-four hours the animals were sacrificed, and by using acid in the fixation fluid, prussian-blue granules were precipitated in sites from the injected fluid. The temporal bones were then sectioned serially and the location of the granules studied with the microscope. In sixteen of twenty animals the blue granules were found in the walls of the endolymphatic sac. From this, Guild concluded that the flow of endolymph was from the stria vascularis down the scala media through the canalis reuniens to the saccule, ending finally in the endolymphatic sac after passing through the endolymphatic duct.

Other theories suggest a radial flow of endolymph across the cochlear duct. Of these theories there are two main types: one suggesting an impermeability of Reissner's membrane with a radial circulation taking place completely within the confines of the scala media, and the other that the permeability characteristics of Reissner's membrane play an important part in the disposition of endolymph.

The most recent advocate of the radial flow theory is Dohlman.[7] On the basis of radioisotope studies he believes that the endolymph arises from the stria vascularis (if this is what he means by "appropriate epithelium") and passes directly into the tectorial membrane, which is the center of metabolic activity. Others,[19] in earlier publications, have labeled the external sulcus as the absorbing region.

In a stimulating article, Naftalin and Harrison[17] have summed up their case for the importance of the permeability of Reissner's membrane in the maintenance of the electrolyte and protein balance between perilymph and endolymph. They suggest that there is a balance between the two fluids which is maintained by Reissner's membrane and the selectively absorptive properties of the stria vascularis.

Many reports of evidence for and against these various theories make definite conclusions hard to reach. The present series of experiments was designed to investigate the direction of flow of the endolymph by studying the spread of sensory cell degeneration after selective rupture of the endolymph-perilymph barrier system. It has been established experimentally[2,6] that when perilymph enters the scala media to replace or contaminate the endolymph, the electrical activity of the organ of Corti in response to sound decreases and the hair cells change in appearance. Breakdown of the barrier allows this contamination to take place and studies of the cochlear potentials and histologic appearance of the sensory areas should indicate the direction of flow of the contaminating perilymph.

Specifically, the following experiments have been designed (1) to determine whether the *pars superior* and *pars inferior* are capable of surviving alone; i.e., whether the flow of endolymph from both parts is toward the endolymphatic duct so that each system can exist without the other, and (2) to determine to what extent restricted parts of the system are independent of others. If there is a longitudinal flow of endolymph, contamination by another solution should have a widespread effect; whereas if there is a radial flow, the effect should remain localized.

METHOD

Fifteen guinea pigs and four cats were used in this series of experiments. The general procedure was to record the cochlear potentials as a measure of sensitivity to vibrations of the organ of Corti before and after various time lapses following selective rupture of the membranous walls of the labyrinth. The animals were then perfused for subsequent examination of the temporal bones. The specific variations to this procedure will be described with the individual experiments. The general procedures for electrical recording[13] and histologic processing[14] have been described in earlier articles.

RESULTS

Independence of Parts of the Membranous Labyrinth

In 1955 Wever, Lempert, Meltzer and Rambo[22] reported to this group past evidence and their own experiments on monkeys demonstrating that single semi-

circular canals can be destroyed without the remainder of either the vestibular or cochlear portion degenerating. In a series of seven monkeys, a portion of the lateral semicircular canal was destroyed in each and the animal allowed to recover. After periods of from thirteen to sixteen weeks the animals were again operated upon and the cochlear potentials recorded and compared with those recorded from the opposite control ear. No significant differences in cochlear action as measured electrically were seen between the ear with the lateral canal destroyed and the control ear.

Histologically it was seen that the portion of the lateral canal which had been destroyed by the operating burr was filled with fibrous or osseous material, but at each end of this region the membranous canal had walled itself off, and for the remainder of its extent in both directions into the vestibule it appeared normal. The cristae of all canals as well as the utricular macula, saccular macula and organ of Corti appeared normal.

Kristensen[11] reported the same thing. In 1842 Flourens[8] had demonstrated that separate parts of the vestibular labyrinth could be destroyed while the others remained functional. Wever and his colleagues showed that such destruction has no influence upon cochlear function.

Reports concerning the results from destructive operations for the relief of symptoms of Ménière's syndrome almost always relate complete deterioration of both vestibular and cochlear functions. Occasionally the destruction is not complete and some cochlear or vestibular function may remain. We need to know what determines the extent of destruction. The extensive observations and subsequent experimental work of Bast[1] on the utriculo-endolymphatic valve suggest that this may be the point where a spread of destruction is stopped. We have carried out a series of experiments on five animals to determine whether the *pars superior* and *pars inferior* function separately on each side of the endolymphatic duct.

It was found that the cochlear alternating-current potentials are unaffected by destruction of the horizontal semicircular canal either immediately after operation, following a short lapse of time, or two months later, and apparently the cochlear potentials are also unaffected by the extent of this injury. Continuous recordings were made on three of the five animals for up to forty minutes following the destruction with no drop in cochlear response. These animals, while still deeply anesthetized, were perfused for histological processing following this continuous recording experiment. By carrying both temporal bones through the processing, the unstimulated ear of each animal served as a control for the surgically altered ear. Each bone was sectioned at 20 microns, and every fifth section stained in hematoxylin and eosin and mounted in serial order.

Figure 1 is a series of photomicrographs taken from sections through the region of damage to the horizontal canal. The animal was allowed to recover for 69 days following the initial injury. These results are identical to those reported by Wever and his co-workers, in that the region of injury has sealed itself off. In the center portion the area is filled with new bone so that the original canal is completely obliterated. Near the ends of the injured portion the bony canal is filled with fibrous tissue and the endolymph containing membranous canal has walled itself off. Beyond the region of the injury the membranous canal appears normal and the perilymph-endolymph barrier intact. Even the ampulla of this canal appears normal. Similar results were evident on all of the animals used in this series regardless of the extent of injury to the lateral canal.

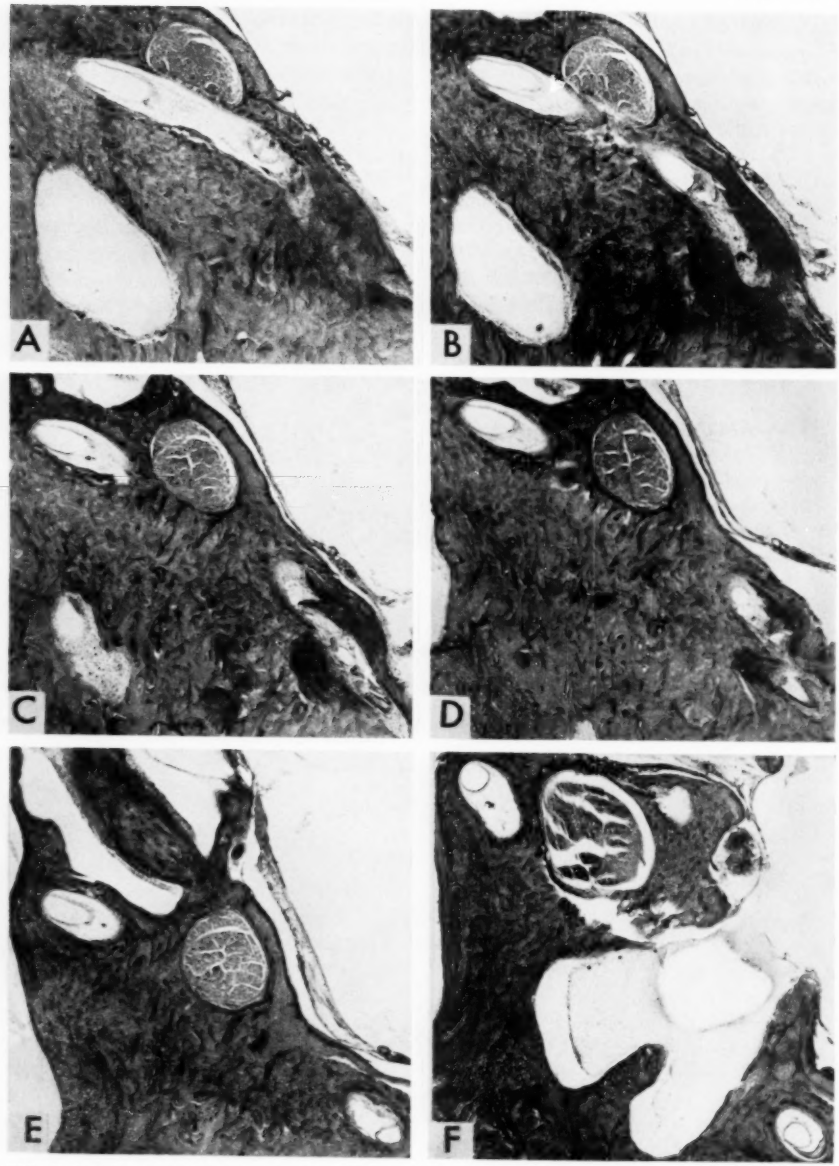

FIG. 1—Serial sections of region of injury in horizontal canal; cut in widths of 20 microns and every fifth section mounted. The membranous canal is normal at both ends of the injury. (GP285L)

A sensitivity curve, that is, the amount of sound at each of twelve frequencies necessary to produce 10 microvolts of response, was taken on the animals before the canals were destroyed. Two months later, when the animals were again operated upon and eventually sacrificed for histologic study, other 10-microvolt sensitivity curves were taken on both the control ear and the surgically altered ear. These curves were plotted as audiograms, using for the normal zero line the average curve as reported earlier for 35 normal guinea pig ears.[14]

mine whether extensive destruction to either part is prevented from spreading to the other by the utriculo-endolymphatic barrier.

In an earlier paper, Dr. McCabe and I[16] reported destruction, of the cochlea and saccule *(pars inferior)* by loud sounds with no concomitant damage to the utricle or semicircular canals *(pars superior)* in several experimental guinea pigs. In these animals there was rupture of Reissner's membrane and collapse of the saccular wall but apparently no

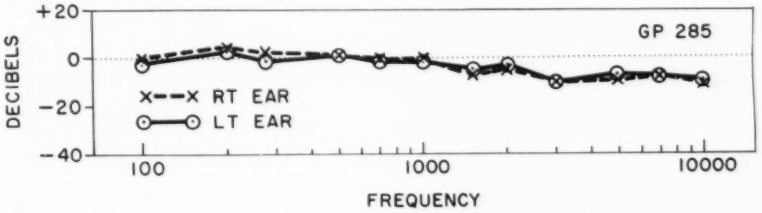

FIG. 2—Electrical audiogram recorded from cochlea of surgically altered right ear shown in figure 1 and compared with response from normal left ear. Zero line from 35 normal guinea pigs reported in reference 14.

Audiograms were taken at the time of the second operation, sixty-nine days after the initial injury. The audiogram in figure 2 and photomicrographs in figure 1 represent the same animal. There is no difference between the sensitivity of the control ear (left) and the altered ear (right), nor is there any significant difference between these and the normal group. Obviously, in confirmation of Wever and his colleagues, Kristensen, and others, destruction of the horizontal canal remains confined to the region of damage and does not spread to other parts of the *pars superior* nor to the *pars inferior*.

The next question is: How extensive can the destruction be and still remain confined to either the *pars superior* or *pars inferior?* It is essential to determine spread of this destruction to the other parts of the membranous labyrinth.

In order to study further this process of restricted spread of destruction, a second group of five guinea pigs was anesthetized and cochlear potential sensitivity functions taken. Several drastic destructive procedures were then tried. In two animals the entire cochlea was removed; in two others a probe was introduced into the round window and the bone of the spiral osseous lamina and modiolus broken up; and in the one remaining animal, the ampulla of the horizontal canal and the structures within the vestibule were destroyed by a burr which also caused considerable maceration of the bone.

In each of the above animals, after a two-month recovery period, the entire

bony labyrinth was filled with bone. Apparently if there is bone damage along with the damage to the membranous labyrinth, excessive new bone is formed and invades the entire labyrinthine system.

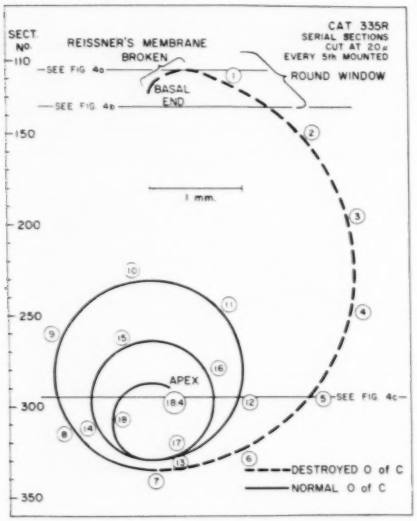

FIG. 3—Graphic reconstruction of cochlea of cat sacrificed 96 days after injury to basal hook and vestibule. Lines indicating sections refer to next figure. Organ of Corti destroyed in one half of basal turn (38 per cent of total basilar membrane). Audiogram shown in figure 7.

In another animal a probe was inserted through the stapes until bone within the vestibule was contacted in the hopes of destroying the utricle and saccule. In this case, after a two-month recovery period, no histologic evidence of damage to any of the structures of the membranous labyrinth could be detected, but the procedure caused the stapes to ankylose and no comparison could be made between measures of cochlear function before and after recovery. Obviously bone damage has to be avoided in this type of experiment, so more careful selective destructions were attempted in two cats.

Figure 3 is a graphic reconstruction of the cochlea of a cat that had been operated upon 96 days before being sacrificed for histologic studies. The initial operation on this animal consisted of exposing the bulla and making a small opening over the region of the round window. A flexible probe with small diameter was carefully inserted through the round window membrane and aimed toward the basal hook of the basilar membrane. The probe was pushed through the basilar membrane into the vestibule so as to rupture the basal portion of Reissner's membrane and puncture the structures of the vestibule. The hole in the bulla was then sealed with dental cement and the wound closed.

Three months later the animal was anesthetized and the dental cement seal removed so as to expose the round window again. This window, though still plainly visible, was somewhat filled in with scar and thickened mucosa. Upon this tissue which filled the round window niche, a platinum-foil electrode was placed and a 10-microvolt sensitivity function for six frequencies from 100 cps to 5000 cps taken. Because no sensitivity measures had been made at the first operation, the recording made at this second operation was compared to the electrical sensitivity of a normal cat as reported by Wever and Lawrence.[21] This is shown in figure 7 and will be referred to again later.

Examinations of the cochlear structures as shown in the graphic reconstruction (fig. 3) show several interesting details in relation to the fluid barriers under discussion. The organ of Corti is destroyed over the entire first half of the basal turn. This amounts to 38 per cent of the entire length of the organ of Corti from base to apex. The only region of rupture of Reissner's membrane, however, is in the lowest part of the basal

hook. The round window shows no sign of having been punctured. The remainder of the basal turn, the middle turn and the apical turn show a normal organ of Corti.

The most interesting observation is that, in addition to this basal-turn damage of the organ of Corti, the saccule, the utricle and cristae of all three semicircular canals have been destroyed.

Three sections of the cochlea are indicated on the graphic reconstruction. These sections refer to the photomicrographs in figure 4, which can be oriented according to the drawing. Figure 4, A shows the basal end of the basilar membrane just inside the round window. The organ of Corti and Reissner's membrane are both missing. In the upper center, part of the stapes and a portion of its footplate can be seen. At the upper left some of the crista from the superior and horizontal canal with the membranous walls are shown collapsed. The common crus of the superior and posterior canals is in the lower left-hand corner and also shows the walls collapsed. Above this and to the right are the collapsed walls of the remainder of the membranous vestibule and part of the degenerated saccule.

In figure 4, B, the organ of Corti is missing and Reissner's membrane is intact. The round window niche contains some excess fibrous tissue. Beneath the stapes the utricule can be seen joining the ampulla of the horizontal canal. The walls of these structures are collapsed and higher power examination of the sensory cells of the utricular macula and of the horizontal canal crista show them to be vacuolated or to have disappeared. Below the common crus is the endolymphatic duct, the only membranous structure that appears normal in this picture.

The next cross section of the cochlea is almost a mid-modiolar one and shows all turns as depicted in the graphic reconstruction (fig. 4, C). The basal turn shows the complete absence of the organ

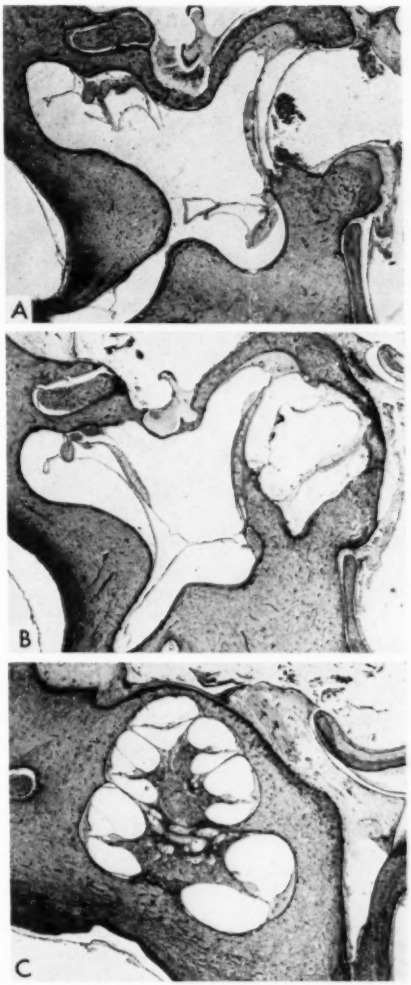

FIG. 4—Photomicrographs of sections indicated in previous figure. (A) Section 115 shows rupture of Reissner's membrane, absence of organ of Corti and complete collapse of structures within vestibule. At low right center is collapsed saccule. (B) Section 135 shows organ of Corti missing, Reissner's membrane intact and collapsed utricle. (C) Section 295 shows all turns normal excepting the basal turn in which the organ of Corti is absent. (Cat 335R)

of Corti, but Reissner's membrane and the basilar membrane are intact. All of the other turns, as indicated in the reconstruction, appear normal.

The reports cited from the literature and the above evidence reveal that as long as there is no damage to the spiral osseous lamina, (1) an injury to any part of the membranous labyrinth will not necessarily result in degeneration of the entire system; (2) an injury to a semicircular canal remains confined to that canal; and an injury to the structures of the vestibule may cause collapse of the vestibular labyrinth because the sensory areas are part of the vestibule structures, but even destruction of the saccule does not cause complete degeneration of the cochlear duct or organ of Corti (at least in the cat, and up to 96 days after the original damage). Apparently, even though phylogenetically and ontogenetically the *pars superior* and *pars inferior* of the membranous labyrinthine system develop separately, the region between them, or the structure described by Bast called the utriculo-endolymphatic valve, does not necessarily serve as a barrier system to protect degeneration in one part from spreading to the other part.

It appears, so far, that this restriction of spread of injury indicates that any particular area is capable of surviving without its neighboring area. There is yet the question of how restricted these areas of damage in the cochlea can be and whether the injury spreads toward the basal end in accordance with a longitudinal-flow theory or remains localized in accordance with a radial-flow theory.

Restriction of Region of Damage in Cochlea

That localized regions of injury can be produced within the cochlea has been known and utilized as an experimental technique for some time. Schuknecht,[20] after producing small lesions by drilling into the walls of the cochlea, allowed the animals to recover and then measured the animals' responses at various frequencies. Histologic examination revealed that the damage had been restricted to the region of the initial injury.

By means of a stain that has a greater affinity for endolymph than for perilymph, it has been possible to demonstrate that even two months following a rupture of Reissner's membrane, the perilymph has not spread through the scala media to other parts of the cochlea.[12] In order to study this restriction of injury more quantitatively, other cats were used in which attempts were made to rupture restricted regions of the scala media through the round window membrane.

Figure 5 is the graphic reconstruction made from the serial sections of the cochlea of a cat that had been operated upon 105 days previous to sacrifice. In the original operation the animal was anesthetized and the round window exposed. A very fine sharp probe was inserted through the round window and directed up the scala tympani of the first turn to the bend of the curve that begins the second half of the basal turn. At this point the probe tip penetrated the basilar membrane and apparently also Reissner's membrane, opening the scala media to perilymph. The operation was then terminated and the animal allowed to recover for 105 days before it was sacrificed for histologic study.

The graphic reconstruction shows the region of puncture between seven and eight millimeter points. The organ of Corti has degenerated in this region and for one more millimeter toward the base. The remainder of the basal turn of the organ of Corti is normal except for the

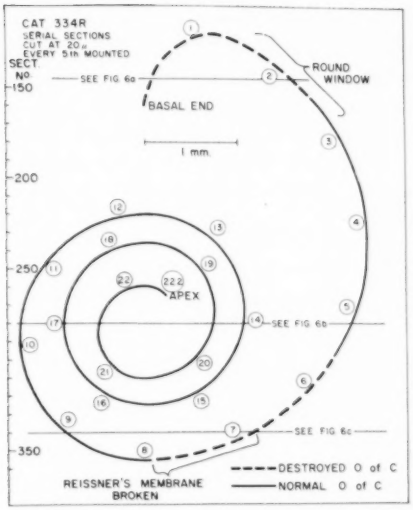

FIG. 5—Graphic reconstruction of cochlea of cat sacrificed 105 days after injury to upper half of basal turn. Lines indicating sections refer to next figure. Organ of Corti destroyed in region of injury and of basal hook but not immediately below region of injury. All other structures normal. Audiogram shown in Figure 7.

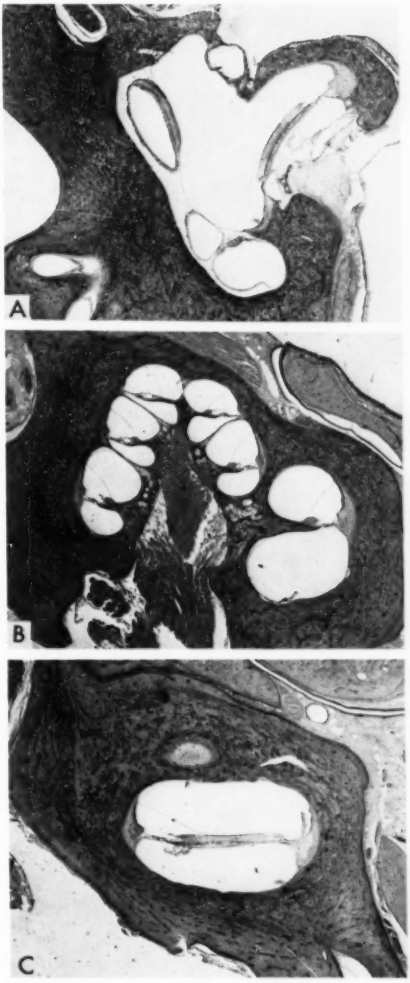

FIG. 6—Photomicrographs of sections indicated in previous figure. (A) Section 145. Round window niche is filled with connective tissue, organ of Corti missing, Reissner's membrane intact. Canals and structures within vestibule are normal. (B) Section 280. Mid-modiolar section with all structures normal. (C) Section 340. Region of injury. Organ of Corti replaced with connective tissue in basal half. Reissner's membrane ruptured. (Cat 334R)

extreme basal tip, where apparently some damage had been done when the probe was inserted. Obviously perilymph contaminating the endolymph at the 8 millimeter point did not flow toward the basal end to damage the rest of the organ of Corti. Similar to that of cat 335, the bend of the basal turn occurs at 36 per cent of the total basilar membrane distance from the basal end. Three histologic sections are marked on the graphic reconstruction corresponding to the photomicrographs in figure 6 and indicating the extent of injury at various regions of the cochlea.

In a section through the region of the round window, considerable scar tissue is noted in the round window niche and in the basal hook region the organ of Corti is missing (fig. 6, A). However, Reissner's membrane is intact. The utricle is normal and the ampullae of the horizontal and superior canals are normal.

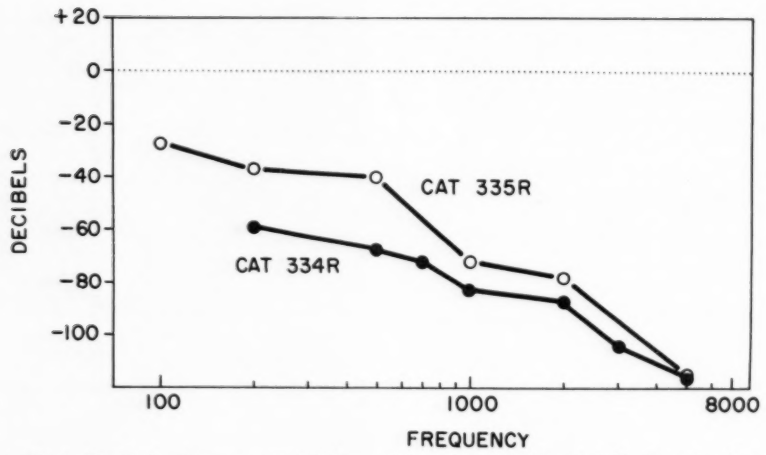

FIG. 7—Electrical audiograms recorded from cochleas of cats 334R and 335R. Zero line from normal cat.[21] Because of excess tissue covering round windows, responses might be 20 decibels better than shown at all frequencies. Despite complete deterioration of canals, utricle, saccule and one half basal turn, cat 335R has a response as good as cat 334R, which had only the upper part of basal turn and basal hook destroyed.

A mid-modiolar section shows normal structures throughout, including the basal turn (fig. 6, B).

At the very bend of the basal turn, the injury to the organ of Corti can be seen (fig. 6, C). The sensory area has been replaced by connective tissue and Reissner's membrane is missing.

At the time of sacrificing this animal, an electrical sensitivity measure was made and as with cat 335R, the results plotted in comparison with the sensitivity of a normal cat. Figure 7 shows the electrical audiograms of cat 335R with a one half basal turn injury and cat 334R with a restricted basal turn injury. Because of the presence of scar tissue in the round window niche, both of these curves ought, probably, to be 20 decibels better for all frequencies than they are, but the important observations lie in the fact that there is a response and that they show the gradually increasing high-frequency loss typical of a basal turn injury.

In cat 335R there was degeneration of all semicircular canals, the utricular macula, the saccular macula and the basal 38 per cent of the cochlea; yet the remainder of the organ of Corti was functional. In cat 334R there was injury only to a portion of the scala media at the 36 per cent point of the basilar membrane. Below this point approximately 13 per cent of the basilar membrane appears to be normal, but this does not show up as functioning for any particular high frequency on the audiogram. Possibly the organ of Corti can appear histologically normal but still not function properly because of some chemical change. Perilymph may flow toward the base contaminating the endolymph and introducing these changes. A more accurate measure of function would seem to be necessary.

By using the cochlear potentials as a measure of function it would seem possible to rupture the scala media in an anesthetized animal at some point while recording the cochlear potentials at the locus of injury and at some point basal

to this to determine whether contaminating perilymph reached that part of the organ of Corti.

This experiment was carried out on four guinea pigs. Figure 8 shows the placement of the electrodes and the method of breaking into the scala media.

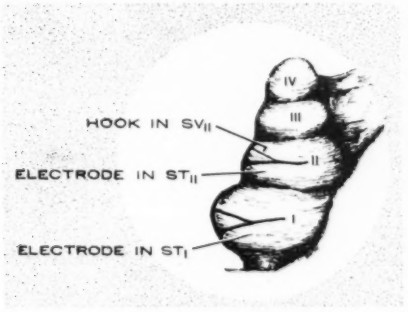

FIG. 8—Diagram of electrode placement and location of minute hook for rupturing Reissner's membrane.

Continuous recordings were made from each of two electrodes, one placed in the scala tympani of the second turn and one in the scala tympani of the first turn.* While the response to a steady tone of 1000 cps was being recorded, a small hole was drilled into the scala vestibuli of the second turn and a very small right angle hook inserted. The object was to cut Reissner's membrane to allow perilymph to flow into the scala media and to determine the effect upon the first

*These electrodes were made from stainless steel wire 0.01 inch in diameter. They were tapered by a controlled electrolytic method so as to reach a diameter of 44 microns at a predetermined distance from the tip. A distance of 390 microns was used for the basal turn and 144 microns for the second turn. A bead of formvar at the appropriate distance prevented insertion of the electrode too far into the 50 micron hole drilled through the cochlear wall and also prevented fluid leakage.

FIG. 9—Photomicrographs through region of holes made in wall of cochlea for insertion of electrodes and hook. (A) The hole is SV_{II} for the hook and hole in ST_{I} for one electrode are shown. Reissner's membrane in second turns has been cut. (B) The hole made for insertion of electrode into ST_{II} is shown. Although it appears to enter SV_{I} the section shown in C shows that the electrode penetrated the bony partition between turns I and II, so the electrode entered ST_{II} (GP 397L).

and second turn cochlear potentials. Following the experiment the animals were sacrificed and perfused for histologic study to see exactly where the electrodes had been placed and the kind of damage done by the hook.

Figure 9 shows the appropriate sections from one of the guinea pigs used in this series. Figure 9, A shows the electrode hole in the scala tympani at the basal turn and the hole for the small hook in the second turn. Not only was Reissner's membrane ruptured, but apparently there was also some injury to the organ of Corti. Figure 9, B shows the electrode hole in scala tympani at the second turn. Although it appears to enter the scala vestibuli of the first turn, the hole apparently continued through the bony separation into the scala tympani of the second turn (fig. 9, C). Typically, it was found that over a 40-minute period (the time of continuous recording) the response recorded from the scala tympani of the second turn fell 14 decibels while the response recorded from the scala tympani of the first first turn did not change. The 14-decibel change in the second turn response may have been due to damage to the organ of Corti by the hook, but at least for the length of time of this experiment, perilymph entering the second turn scala media did not flow down to the basal turn to affect the function of the organ of Corti in this region.

CONCLUSIONS

Summing up the evidence of these experiments and other earlier ones, it appears that in general an injury to any part of the membranous labyrinth tends to remain confined to that region. This appears true for the cochlea and semicircular canals. Thus the *pars inferior* and *pars superior*, although phylogenetically developing differently, are not necessarily separate functionally by virtue of this fact, but only by the fact that the sensory systems seem to function separately among and within themselves.

If destruction to the structures within the vestibule is too great, the ampullae of the semicircular canals which open widely into the vestibule, the utricle, saccule, and basal turn of the cochlea may show changes or complete degeneration, but this does not doom the upper turns of the cochlea, although the audiogram may then show sloping loss for the high frequencies (fig. 7).

The evidence that the flow of endolymph in the cochlea is radial is gradually mounting. This would indicate that any one region of the cochlear duct is independent of the other. The role of Reissner's membrane has not been determined other than that it serves as a simple barrier between endolymph and perilymph. It may serve as a selectively diffusible membrane, as suggested by Naftalin and Harrison.

The function of the endolymphatic duct and sac has never been made clear and the evidence is not consistent. Blockage of the duct does not result in an accumulation of endolymph[15] and the duct can be completely severed from the cochlear duct without degeneration of the upper turns of the organ of Corti. The endolymphatic duct served an important function in the earliest evolutionary form of the ear before a saccule and cochlea were ever developed, and it may well be that it plays no part whatsoever in the functioning of these structures.

From the evidence now at hand it appears the endolymph circulates radially within the cochlear duct. We have next to determine the function of the various structures around the walls of the scala media.

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A STUDY OF HEARING IN CHILDREN

The Subcommittee on Hearing in Children is a group operating under the Committee on the Conservation of Hearing of the American Academy of Ophthalmology and Otolaryngology. A research grant from the National Institute of Neurological Diseases and Blindness has supported studies of hearing problems of childhood in Pittsburgh schools in cooperation with the University of Pittsburgh, and in Baltimore with the Johns Hopkins University, where extensive studies have been in progress for several years. Other financial support is provided by a grant from the Children's Bureau through the Commonwealth of Pennsylvania Department of Health to the University of Pittsburgh. In addition to the usual progress reports made to the Council of the Academy and to the NIMDB Council, the authors have further described their work in the two following articles under the general title "A Study of Hearing in Children": *I. Objectives and Preliminary Findings,* read at the meeting of the Committee on Conservation of Hearing and the Otosclerosis Study Group in Chicago, October 8, 1960; *II. Acoustic Environment and Audiometer Performance,* reprinted from the JOURNAL OF SPEECH AND HEARING RESEARCH, June 1961.

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The assistance of the Department of Occupational Health in the University of Pittsburgh's Graduate School of Public Health, and in particular of Assistant Professor Kenneth Stewart, Director of its Acoustic Laboratory, is also gratefully acknowledged.

We would like to mention the excellent cooperation received from parents of the children, and the Pittsburgh Board of Education. In addition, it would not have been possible to conduct the study without the continuing support we have received from a number of individuals in the Pittsburgh Department of Education, particularly the five school principals in the study schools, the Director of School Health Services and the Director of Elementary Education. Members of the Allegheny County Health Department have also given their cooperation, in particular the Health Officer, the Health District Directors and their staffs, the Director of Public Health Nursing and the Director of Maternal and Child Health. This study has been approved by the Allegheny County Medical Society.

A STUDY OF HEARING IN CHILDREN

I. Objectives and Preliminary Findings

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and

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PITTSBURGH, PENNSYLVANIA

OBJECTIVES

BECAUSE of a lack of definitive information concerning hearing problems in children, the American Academy of Ophthalmology and Otolaryngology directed the Subcommittee on Hearing in Children of its Committee on Conservation of Hearing to institute a nationwide program to study problems relating to conservation of hearing in children. Since October 1956, the Subcommittee has been engaged in this program, which has the following specific aims:

1. To develop the most efficient case finding methods and to use these methods in estimating the magnitude of the problem in the country

2. To help develop standards for medical and surgical rehabilitation

3. Ultimately to use the Subcommittee findings in assisting professional workers to improve and enhance programs for children with impaired hearing.

In considering these aims, it became readily apparent to the Committee that a body of fundamental information regarding both the nature and extent of the problems relating to hearing conservation in children, and services now existing to find, alleviate or cure them, are not available on a national basis. It was decided, therefore, to design studies in sufficiently broad terms to produce this information in a statistically sound fashion so that administrative and clinical guidelines can be clearly established.

The initial move was to develop a pilot study to obtain normative data on hearing in children and to develop the methods and techniques for the Subcommittee's national studies. This study is now being conducted in Pittsburgh, through the cooperation of the Subcommittee and the Maternal and Child Health Section of the University of Pittsburgh's Graduate School of Public Health. Its objectives are to evaluate methods for the testing of hearing in children in order to decide which methods are more efficient and economical in terms of time and manpower; to evaluate and define medical signs and symptoms which may indicate danger of hearing impairment; and

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Presented at the *Special Program* of the Committee on Conservation of Hearing and the Otosclerosis Study Group at the Sixty-Fifth Annual Session of the American Academy of Ophthalmology and Otolaryngology, Oct. 9, 1960, Chicago.

to consider the psychological, social and other effects of such impairment.

From the study it is hoped to obtain a body of normative data on hearing in children, and to ascertain the patterns of hearing, the physical findings, events in the medical history and various aspects of child development which are of predictive value in indicating the possibility of hearing impairment. An integral part of the study will be an evaluation of methods necessary for obtaining the above information and decision as to which of these are feasible for hearing conservation generally.

This paper is the introduction to a series of papers planned to present various aspects of the study methods and results; in this instance, the study objectives and certain preliminary findings based on data collected between June 1, 1958, and June 30, 1959. In general terms, the paper will describe solutions found to problems encountered in project organization, provision of acoustic environment, audiometer performance and test examination procedure. Most of these problems arose out of the effort to conduct a field study at laboratory standards. Also included are comments on relationships between hearing levels and otological findings, and between hearing levels and events in the medical histories of the children. Full details and data on the study population, methods and findings will be presented in one or another of the subsequent papers in the series.

ORGANIZATION

A full time executive director, Eldon L. Eagles, M.D., was appointed and is directing the study in Pittsburgh as well as the planning of other studies to be sponsored by the Subcommittee in the future. A staff was recruited and trained, and is now in full operation. The Executive Director and the staff are members of the Maternal and Child Health Section of the University of Pittsburgh's Graduate School of Public Health, which also supplies office space for the various study activities.

The study was organized and developed during the period from July 1957 to May 1958. During this time, four phases of the study ran more or less concurrently, namely, general organization; choice, purchase and testing of equipment; acquiring and training of the staff, and the development and testing of various forms and procedures to be used in the study. The actual study of the hearing of children used as subjects in the project was started during the latter part of the above period.

The study in Pittsburgh, which is planned for at least a five-year period, is being conducted on children ranging in age from 3 to 17 years. Up to September 1, 1960, there had been 6,248 children in the study, with a study population of 4,067 on that date. The children of school age form 97.5 per cent of the enrollment of the four public elementary schools in which the study is being conducted. These schools were chosen to represent, as a group, a socio-economic cross section of the general Pittsburgh public school population. The children of preschool age who have been used in the tests are those who are expected to enter the same four schools.

Individual air conduction hearing level determinations and otological examinations were started in April 1958. Medical histories of the children in the study were also obtained. By September 1, 1960, 14,170 hearing level determinations and 7,249 otological examinations had been made.

Although the project is primarily one of research, it is conducted as a supplement to the health programs already in existence in the schools and to provide

meaningful service to the children and their parents. Reports of otological examinations and hearing level determinations are sent to the parents, with copies for the family physicians and the public health nurses who do school health nursing in the study schools. When conditions are found that need medical or audiologic investigation, the public health nurses follow them with the parents and family physician, and then, if necessary, with the otologist and audiologist.

ACOUSTIC ENVIRONMENT

Because it was felt that normal hearing in children is substantially more sensitive than the adult norms in current use, it was deemed necessary to provide an acoustic environment in which hearing levels could be measured to 30 decibels below the American Standard audiometric zero without masking. This was accomplished by establishing audiometric test rooms in the study schools at sites chosen after acoustic surveys demonstrated that they were relatively quiet areas. The audiometric test rooms consisted of commercially produced prefabricated portable rooms. Each room is double-walled, its walls and roof being formed of four-inch-thick acoustic panels with an air space intervening between them. In table I, the results of a recent acoustic survey in one school are summarized. The findings in this survey, which was made after the rooms had been in use over a year, are typical of the conditions found at the remaining three study sites. The results of the acoustic survey for a variety of background noise conditions are tabulated in sound pressure levels by octave band. The sound pressure levels inside the test room can be compared with the maximum allowable sound pressure levels[2] which are given in the lowest line of the table. If one looks at the sound pressure levels in the 150 to 300 octave band obtained in the test room, one can see that these are the same as the maximum allowable sound pressure level, namely, 10 decibels. When the attenuating effect of the earphones is added, there is a margin of safety which allows determination of hearing levels to 30 decibels below audiometric zero, which is our objective.

AUDIOMETERS

Because commercially available audiometers ordinarily do not test with linearity much below audiometric zero, effort was made at the outset to establish whether such audiometers could be modified to serve the study purpose of measuring hearing levels down to 30 decibels below audiometric zero. It was decided that audiometers should be constructed with auxiliary 40-decibel precision attenuators placed in the earphone lines so that low hearing levels could be measured accurately.

An audiometer manufacturing company modified six audiometers of a standard model in the manner described, and guaranteed them to meet the American Standard Specification for instruments of this type.[6] The audiometers are equipped with Western Electric 705-A earphones chosen because the threshold characteristics are known. The use of these earphones has added considerable significance to the data on hearing levels obtained in the study.

The audiometers were not required to have arrangements for masking or bone conduction. The frequencies supplied are 250, 500, 1000, 2000, 4000, 6000, and 8000 cycles per second. The attenuator dials are graduated in steps of 5 decibels from zero to 60 decibels. Repeated calibrations have confirmed that the objective of producing accurate sound pressure output down to 30 decibels below audiometric zero has been attained.

TABLE I

SOUND PRESSURE LEVELS RECORDED DURING ACOUSTIC SURVEY AT H. C. FRICK SCHOOL SEPTEMBER 15, 1959

LOCATION	SOUND PRESSURE LEVELS IN DECIBELS RE 0.0002 DYNE PER CM^2 AS MEASURED IN THE OCTAVE BANDS LISTED									COMMENTS
	20-10,000 cps	20-75 cps	75-150 cps	150-300 cps	300-600 cps	600-1200 cps	1200-2400 cps	2400-4800 cps	4800-10,000 cps	
Outside Audiometric Test Room	62	58	54	54	48	42	38	34	28	Hall door—Closed Test Room Ventilator—On Conversation in room
	58	55	54	48	43	33	36	32	30	Hall door—Closed Test Room Ventilator—On No conversation
	58	54	52	50	52	46	50	48	30	Hall door—Closed Test Room Ventilator—On During lunch period
	58	50	55	54	54	51	44	38	36	Hall door—Open Test Room Ventilator—Off Conversation in room
Inside Audiometric Test Room with Test Room Door Closed	43	44	30	11	8	8	9	9	13	Hall door—Open Test Room Ventilator—On
	46	44	24	7	8	8	9	10	13	Hall door—Closed Test Room Ventilator—Off Classes changing
	48	49	38	11	9	8	8	9	13	Hall door—Closed Test Room Ventilator—Off Lunch period
	44	46	29	10	8	7	8	9	14	Hall door—Closed Test Room Ventilator—Off
Maximum allowable sound pressure levels to determine hearing levels at 30 decibels below audiometric zero with no masking			10	10	10	10	12	22	32	

The audiometers are of a type that is widely used throughout the country. The manufacturing company cooperated in meeting its guarantee that the audiometers comply with the American Standard Specification. We emphasize that our experience with audiometer calibration and performance, described as follows, is not unique to the make of audiometer used in the study.

AUDIOMETER PERFORMANCE

For the purposes of this paper the experiences with audiometer calibration and performance are summarized; they will be described in detail in the second paper in this series (published herewith).[3]

Before the audiometers were used in the study, their calibration was checked by the Sound Section of the National Bureau of Standards. At the first calibration, none of the audiometers met the American Standard Specification, and it required several return trips to the manufacturer over a period of five months in the case of most of the audiometers before they met the specification in all respects. The difficulties encountered in getting the audiometers to meet the specifications clearly demonstrated that we could not obtain significant data on hearing levels unless we had comprehensive calibration and repair facilities easily and quickly available. As a result of these findings, the Department of Occupational Health in the Graduate School of Public Health expanded its Acoustics Laboratory so that by the time the audiometers met specifications, the laboratory was fully equipped to carry out artificial ear calibration of the audiometers as well as any repairs needed. This laboratory maintains a standard microphone which is periodically checked by the sound section of the National Bureau of Standards and other recognized acoustic laboratories, with the result that calibration data supplied have the significance needed for research purposes.

After the initial calibration and starting when the audiometers were first used in the study, calibration was performed at intervals of seven to ten days. The interval between calibrations was gradually lengthened; after four months the interval was set at one month, where it has remained. Our experience led us to the decision that we could not go beyond the monthly interval limit. On occasion, incidents in the performance of an audiometer have necessitated more frequent calibrations. The audiometers have met the American Standard Specification at all times while in use in the study. This situation has been maintained only with constant vigilance on the part of the research staff and by one major alteration in the circuitry of the audiometer.

The need to alter the circuitry of the audiometers arose from the problem created by delay in tone presentation and by overshoot and undershoot of tone beyond the specification. Delay in tone presentation outside the specified limits of between 0.1 and 0.5 seconds to one or more seconds can cause a situation in which a patient is listed as not having heard at a certain level when actually the tone has not been presented because the interrupter switch has been turned on for less than one second. Undershoot and overshoot beyond the limits of plus or minus 1 decibel can shift a hearing level as recorded by 5 decibels, if this is the interval being used in the attenuator dial. These problems are common with audiometers and arise from the fact that tone interruption is usually accomplished by starting and stopping a Wien bridge oscillator. The difficulty was solved by designing and constructing a separate electronic switch and placing it between the oscillator and the output. This, in turn, introduced other electronic problems, all of which were finally solved by

the staff of the Acoustics Laboratory. If the problem of tone presentation had not been solved, the hearing levels measured by the audiometers could have had little research significance.

TABLE II

MAJOR DEFECTS IN PERFORMANCE OF SIX AUDIOMETERS SHOWING NUMBERS OF TIMES OF OCCURRENCE, DURING THE PERIOD JULY 1, 1958, TO MARCH 31, 1960

DEFECT IN PERFORMANCE	NUMBER OF TIMES OF OCCURRENCE
Sound Pressure Output Approaching or Exceeding Tolerance Limits	45
Faulty Earphone Performance	10
Earphones replaced due to Performance	6
Frequency Outside 5% Tolerance	8
Harmonic Distortion	7
Extraneous Instrument Noise	4
Worn Interrupter Switch	2
Defect in 40 db Attenuator	4
Defect in Electronic Switch	1

In addition to the difficulty of tone presentation, other problems arose which are listed in table II, for the 21-month period from July 1, 1958, to March 31, 1960. The greatest of these problems was the tendency of the audiometers to produce variation in sound pressure output outside the tolerance limits of plus or minus 4.0 decibels at the test frequency of 2000 cycles per second (cps) and lower, and plus or minus 5.0 decibels at the frequencies above 2000 cps. The longest continuous period during which each audiometer remained within sound pressure output specifications was: one for eight months, one for five months, one for four months, two for three months, and the sixth stayed within specifications no longer than two months. Even when audiometers were within the American Standard Specification, it was commonly found that the instruments produced a difference of up to eight to ten decibels from one time to another.

It should be repeated; our experience is not unique to the make of audiometer used in the study. Information obtained from authoritative sources and from recent publications confirms our observations.[4,5]

Because of the effect of certain variations on the hearing level determination readings, adjustments are made for each period between calibrations for the following factors: variation in sound pressure output within allowable limits; deviations in attenuator linearity at various intensity levels; and a statistical adjustment to allow for the theoretical distribution of hearing levels within the 5-decibel attenuator steps. In some instances the algebraic addition of the sum of the errors to a hearing level reading did not change it, but in other instances a shift of five to ten decibels resulted.

AUDIOMETER TECHNICIANS

Four audiometer technicians are currently employed to determine hearing levels. These technicians are trained by our audiologist with the assistance of members of the University of Pittsburgh's Department of Audiology. Strict supervision of the technicians is maintained, including a continuous check of the hearing levels they report. Periodically, consistency tests are conducted. The results of such a test, which are fairly typical of others that have been carried out, are to be found in table III. Because of the periodic consistency tests and the determination that differences between readings obtained by the different technicians in this study have no statistical significance, we are able to consider the study population as a unit rather than as four separate populations. We are strengthened in this assumption by a further check in which mean hearing levels have been determined by tech-

TABLE III

AVERAGE AND RANGE OF HEARING LEVELS OBTAINED BY FOUR AUDIOMETER TECHNICIANS IN A CONSISTENCY TEST CONDUCTED WITH TWELVE CHILDREN IN JUNE 1959.

FREQUENCY IN CYCLES PER SECOND	EAR	AVERAGE OF HEARING LEVELS OBTAINED BY ALL TECHNICIANS IN DECIBELS RE AUDIOMETRIC ZERO[1]	RANGE AMONG FOUR TECHNICIANS IN DECIBELS		
			FROM	TO	DIFFERENCE
250	R	—16.0	—13.7	—17.5	3.8
	L	—14.8	—12.9	—15.8	2.9
500	R	—11.6	—10.0	—14.2	4.2
	L	— 9.8	— 8.3	—12.1	3.8
1000	R	—12.1	—10.8	—13.7	2.9
	L	—11.4	—10.8	—12.1	1.3
2000	R	—11.2	—10.0	—12.5	2.5
	L	— 8.7	— 7.5	— 9.6	2.1
4000	R	— 4.7	— 1.7	— 6.7	5.0
	L	— 5.4	— 3.3	— 8.3	5.0
6000	R	— 5.1	— 1.2	— 7.9	6.7
	L	— 1.1	+ 4.2	— 3.7	7.9*
8000	R	— 6.8	— 1.7	—10.0	8.3
	L	— 2.7	— 0.8	— 5.4	4.6

[1]Based upon 12 observations.

*This is the only instance on this table where, by means of the technique of analysis of variance, it has been determined that in less than 5 per cent of the time would the observed difference among the four technicians be due to chance alone.

nicians for the individual school population with which each works. These mean hearing levels show no significant differences between any of the schools.

The technique used in obtaining hearing levels is a multiple trial modified method of limits similar to the Hughson-Westlake procedure described by Carhart and Jerger.[1]

ANALYSIS OF DATA COLLECTED BETWEEN JUNE 1, 1958, AND JUNE 30, 1959

The children in the study population which was chosen to represent a socioeconomic cross section of the Pittsburgh public school population range in age from the preschool years up through the age of puberty and are untrained but cooperative listeners. At the time of their

TABLE IV

FREQUENCY DISTRIBUTION OF CHILDREN ON WHOM FIRST RELIABLE HEARING LEVELS WERE DETERMINED FROM JUNE 1958 TO JUNE 1959 BY AGE, SEX AND RACE OF CHILD

AGE AT FIRST TEST	ALL CHILDREN	MALE			FEMALE		
		TOTAL	WHITE	NONWHITE	TOTAL	WHITE	NONWHITE
All Ages	3882	1961	1396	565	1921	1351	570
2-3	67	36	31	5	31	23	8
4	112	52	43	9	60	56	4
5	393	178	145	33	215	170	45
6	417	205	155	50	212	150	62
7	346	171	115	56	175	115	60
8	317	154	98	56	163	108	55
9	334	170	118	52	164	114	50
10	305	164	107	57	141	98	43
11	406	200	143	57	206	149	57
12	404	197	149	48	207	146	61
13	347	170	121	49	177	118	59
14	275	150	96	54	125	80	45
15	117	86	56	30	31	16	15
16-17	42	28	19	9	14	8	6

hearing level determinations and otological examinations, they were in attendance at school and functioning as children without known illness. The study population had no extensive work experience and presumably no undue exposure to noise. This study differs from a number of comparable studies in that the population was unselected, comprised a younger age group and was composed of untrained listeners, and testing was performed throughout the entire year. The presence of a recent respiratory infection in a child attending school did not cause postponement of hearing level determinations and otolaryngologic examinations, although this and findings of a similar nature were noted and further explored.

Between June 1, 1958, and June 30, 1959, a total of 6,984 hearing level determinations were made on 3,938 children; of these children, 3,019 had a concurrent otologic examination. Of the hearing level determinations done, 3.5 per cent were discarded because the technicians reported a lack of confidence in the results. The remaining 96.5 per cent were labeled "reliable" for the statistical analyses.

The frequency distribution of the 3,882 children whose first hearing level determinations were judged reliable is shown in table IV by age, sex and race of the child. This same information is shown as a percentage distribution in table V.

TABLE V

PERCENTAGE DISTRIBUTION OF CHILDREN ON WHOM FIRST RELIABLE HEARING LEVELS WERE DETERMINED FROM JUNE 1958 TO JUNE 1959 BY AGE, SEX AND RACE OF CHILD

AGE AT FIRST TEST	ALL CHILDREN	MALE			FEMALE		
		TOTAL	WHITE	NONWHITE	TOTAL	WHITE	NONWHITE
All Ages	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2-3	1.7	1.8	2.2	0.9	1.6	1.7	1.4
4	2.9	2.6	3.1	1.6	3.2	4.1	0.7
5	10.1	9.1	10.4	5.8	11.2	12.6	7.9
6	10.7	10.5	11.1	8.8	11.0	11.2	10.9
7	8.9	8.7	8.2	9.9	9.1	8.5	10.5
8	8.2	7.9	7.0	9.9	8.5	8.0	9.6
9	8.6	8.7	8.4	9.2	8.6	8.4	8.8
10	7.9	8.4	7.7	10.1	7.3	7.2	7.5
11	10.5	10.2	10.2	10.1	10.7	11.1	10.0
12	10.4	10.0	10.7	8.5	10.8	10.8	10.7
13	8.9	8.7	8.7	8.7	9.2	8.7	10.4
14	7.1	7.6	6.9	9.6	6.5	5.9	7.9
15	3.0	4.4	4.0	5.3	1.6	1.2	2.6
16-17	1.1	1.4	1.4	1.6	0.7	0.6	1.1

The ages of the children are fairly evenly distributed between 5 and 14 years. Smaller numbers are in the under 5 and in the 15, 16 and 17 year groups. There is an approximately equal total distribution between males and females. Just under 30 per cent of the population is nonwhite, which corresponds closely to the total nonwhite population in Pittsburgh public schools.

HEARING LEVEL DETERMINATIONS ON THE TOTAL STUDY POPULATION

The mean and median hearing levels of the 3,882 children who had reliable hearing level determinations can be seen in table VI. These statistical norms or reference levels are significantly lower or more sensitive than the present audiometric zero, particularly in the lower frequencies and in the speech range, despite the fact that the children as a group (age range, 3 to 17 years) include those with otological abnormalities and those who may have had a recent respiratory infection. A number of children had two or more reliable hearing level determinations during the period under analysis. A comparison of mean hearing levels at first and second determinations reveals that the second determinations are approximately 1 decibel lower than the first (table VII). Other analyses of data up to this time do not indicate that there is a significant difference in hearing levels

TABLE VI

MEAN AND MEDIAN HEARING LEVELS OF ALL CHILDREN TESTED (1) JUNE 1958-JUNE 1959, EACH FREQUENCY AND EAR (HEARING LEVELS IN DECIBELS RE AUDIOMETRIC ZERO, AMERICAN STANDARD, AND RE 0.0002 DYNES/SQ. CM.)

FREQUENCY (cps)	NUMBER OF EARS TESTED		MEAN HEARING LEVEL (db)				MEDIAN HEARING LEVEL (db)			
			RE AUDIOMETRIC ZERO		RE 0.0002 DYNES/SQ. CM.		RE AUDIOMETRIC ZERO		RE 0.0002 DYNES/SQ. CM.	
	RIGHT	LEFT	RIGHT EAR	LEFT EAR	RIGHT EAR	LEFT EAR	RIGHT EAR	LEFT EAR	RIGHT EAR	LEFT EAR
250	3511	3510	—8.3	—9.1	32.3	31.5	—10.4	—10.5	30.2	30.1
500	3879	3879	—5.6	—5.9	19.2	18.9	— 6.4	— 6.3	18.4	18.5
1000	3881	3882	—3.8	—3.7	12.9	13.0	— 5.8	— 5.4	10.9	11.3
2000	3870	3869	—3.1	—3.2	13.9	13.8	— 4.5	— 5.0	12.5	12.0
4000	3491	3489	—1.9	—1.7	13.2	13.4	— 3.8	— 3.6	11.3	11.5
6000	3548	3546	—0.1	0.0	16.6	16.7	— 2.4	— 2.3	14.3	14.4
8000	3469	3469	—1.2	—1.2	19.7	19.7	— 3.4	— 3.5	17.5	17.4

(1) Based on the first reliable hearing level determination obtained for each child.

(2) Although 3,882 children had hearing level determinations, all children were not tested at each frequency which accounts for the different number of ears tested at the various frequencies. During the early months of the Study, younger children were tested only at selected frequencies. At a later date this group was tested at all seven frequencies.

TABLE VII

MEAN AND MEDIAN HEARING LEVELS AMONG 1,970 CHILDREN TESTED BETWEEN JUNE 1958 AND JUNE 1959 WHOSE FIRST AND SECOND AUDIOMETRIC TESTS WERE BOTH RELIABLE EACH FREQUENCY, LEFT EAR

(IN DECIBELS RE AUDIOMETRIC ZERO, AMERICAN STANDARD)

FREQUENCY (cps)	NUMBER EARS TESTED* FIRST TEST	NUMBER EARS TESTED* SECOND TEST	MEAN HEARING LEVEL FIRST TEST	MEAN HEARING LEVEL SECOND TEST	MEDIAN HEARING LEVEL FIRST TEST	MEDIAN HEARING LEVEL SECOND TEST
250	1818	1943	—9.8	—11.0	—10.9	—12.2
500	1969	1969	—6.8	— 7.7	— 8.1	— 8.7
1000	1970	1970	—4.7	— 5.6	— 5.8	— 6.8
2000	1964	1967	—3.8	— 4.6	— 5.1	— 5.7
4000	1814	1937	—2.5	— 3.4	— 4.3	— 4.8
6000	1829	1956	—0.9	— 2.2	— 2.9	— 4.0
8000	1813	1934	—2.5	— 3.8	— 4.3	— 5.8

*In explanation of the differences in the number of ears tested at the time of the first and second tests, it should be noted that a certain degree of incompleteness existed in a portion of the tests. Although 1,970 children had both first and second tests which were reliable, not all of these children were tested at the same frequencies on both occasions. For the first three months of the study, preschool children were tested at frequencies of 500, 1000, and 2000 cps, plus the first presentation at 4000 cps for learning purposes. At a later point in time, all seven frequencies were tested among the vast majority of this group.

between the right and left ears in the children as a group. The differences between hearing levels of white and nonwhite children do not appear to be significant. The mean hearing levels show variation by month, being somewhat less sensitive in those months in which respiratory infection and allergic reactions are more common. Full documentation of these aspects will be published when observations have been collected and analyzed for a longer span of time.

RELATIONSHIPS BETWEEN OTOLOGICAL FINDINGS AND HEARING LEVELS

In considering the relationships between otological findings and variations in hearing sensitivity described in this section, and also between events in the medical histories and hearing levels in a later section, it should be borne in mind that these relationships were found at one point in time; and that the full significance of the associations can only be learned following observations over an extended period. These relationships, therefore, serve to point to those factors which are to receive special attention as the longitudinal study proceeds.

The otological abnormalities found on the first examination of 3,203 children during the period June 1, 1958 to June 30, 1959 and their prevalence are listed in table VIII. Mean hearing levels by frequency were calculated by ear for ears with and without these abnormalities.

Significant differences occur when ears with tympanic membranes showing increased vascularization, retraction, bulging, scarring, impaired mobility, perforations, discharge or calcium plaques are compared with those not exhibiting any of these findings. In each

TABLE VIII

RESULTS OF OTOLOGICAL EXAMINATION OF 3,203 CHILDREN, GIVING THE NUMBER AND PERCENTAGE OF EARS SHOWING CERTAIN ABNORMALITIES

OTOLOGICAL ABNORMALITY	RIGHT EARS		LEFT EARS	
	NUMBER	PERCENT	NUMBER	PERCENT
A. Cerumen in Auditory Canal Resulting in Unsatisfactory Visibility of Tympanic Membrane	274	8.6	309	9.6
B. Abnormalities of Tympanic Membrane				
Increased vascularization	50	1.6	52	1.6
Bulging	6	0.2	10	0.3
Retraction of pars tensa	87	2.7	103	3.2
Retraction of pars flaccida	49	1.5	48	1.5
Scarring	139	4.3	91	2.9
Impaired mobility	107	3.2	84	2.7
Perforation	11	0.3	19	0.6
Discharge	4	0.1	8	0.2
Calcium plaques	38	1.2	40	1.2
Cholesteatoma and tumor	0		0	

instance, those with an abnormality had less sensitive hearing levels. The mean hearing levels of ears without these abnormalities range by ear and frequency between —10.2 decibels at 250 cps to —0.7 in the higher frequencies. The hearing levels of ears with the more frequent abnormalities of the tympanic membrane range by frequency as follows:

	RANGE IN DECIBELS
Increased vascularization	minus 2.6 to plus 12.8
Retraction of pars tensa	minus 1.5 to plus 12.6
Retraction of pars flaccida	minus 2.7 to plus 10.6
Impaired mobility	minus 0.6 to plus 10.6
Calcium plaques	minus 8.2 to plus 9.9
Scarring	minus 5.1 to plus 6.6

In each case, these hearing levels are most sensitive in the low frequencies and decrease in sensitivity, as frequencies rise, to their least sensitive point, usually at 6000 and 8000 cps.

An examination of the nose and oral pharynx was carried out on each child in addition to the otologic examination. The mere presence or absence of abnormalities of the nose or oral pharynx without relation to previous history did not show definite statistical association with variation in hearing sensitivity.

As a further step towards arriving at physiological baselines for the study population, children were divided into categories, otologically "normal" and otologically "abnormal." With respect to the group with abnormal otologic findings, no attempt is made here to separate the children by diagnostic categories. These children include those with both active and inactive pathologic conditions. It should be noted again that all children were in regular attendance at school at the time physical examinations were made.

TABLE IX

MEAN AND MEDIAN HEARING LEVELS AND STANDARD DEVIATIONS FOR CHILDREN IN OTOLOGICALLY "NORMAL" AND "ABNORMAL" POPULATIONS TESTED BETWEEN JUNE 1958 AND JUNE 1959, EACH FREQUENCY BY EAR

(HEARING LEVELS IN DECIBELS RE AUDIOMETRIC ZERO, AMERICAN STANDARD)

FREQUENCY (cps)	RIGHT EAR							
	NUMBER TESTED		MEAN HEARING LEVEL		MEDIAN HEARING LEVEL		STANDARD DEVIATION	
	NORMAL[1]	ABNORMAL[2]	NORMAL	ABNORMAL	NORMAL	ABNORMAL	NORMAL	ABNORMAL
250	2029	412	—9.8	—5.2	—10.6	—6.9	7.7	12.2
500	2175	457	—7.2	—2.2	— 7.4	—4.5	7.6	12.3
1000	2175	457	—5.3	—0.3	— 5.8	—2.7	7.6	12.7
2000	2174	456	—4.4	—0.1	— 4.7	—2.9	8.0	13.0
4000	2026	411	—3.6	+2.3	— 4.1	—1.4	9.2	15.2
6000	2040	420	—1.8	+4.4	— 3.0	+0.7	10.1	15.5
8000	2017	407	—3.0	+3.4	— 3.9	0.0	11.0	17.8

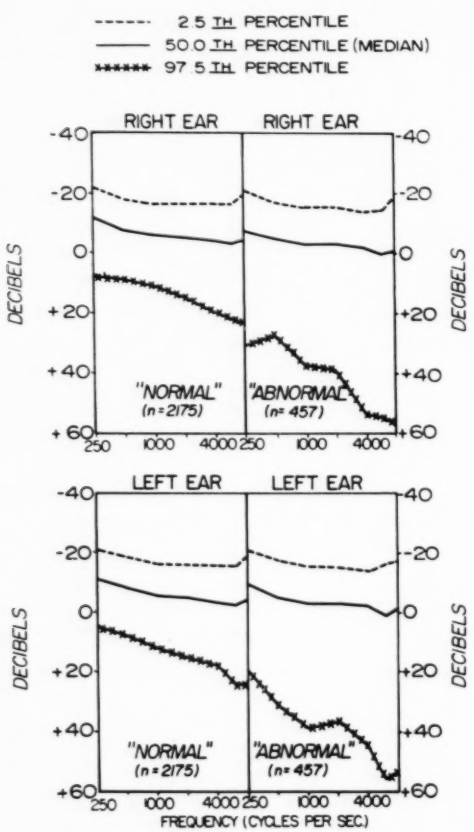
FREQUENCY (cps)	LEFT EAR							
	NUMBER TESTED		MEAN HEARING LEVEL		MEDIAN HEARING LEVEL		STANDARD DEVIATION	
	NORMAL[1]	ABNORMAL[2]	NORMAL	ABNORMAL	NORMAL	ABNORMAL	NORMAL	ABNORMAL
250	2029	413	—10.6	—6.8	—11.1	—8.9	7.1	10.7
500	2175	457	— 7.4	—3.0	— 7.8	—4.8	7.3	11.4
1000	2175	457	— 5.2	—0.2	— 5.6	—2.8	7.4	12.7
2000	2173	456	— 4.5	—0.7	— 4.8	—2.8	8.2	12.6
4000	2026	410	— 3.1	+1.2	— 3.7	—2.2	9.1	14.0
6000	2040	419	— 1.4	+3.7	— 2.4	+0.7	10.3	15.7
8000	2018	406	— 3.0	+3.0	— 3.8	—0.5	11.1	16.7

1. Otologically Normal = 2,175 Children
2. Otologically Abnormal = 457 Children

An otologically "normal" child is defined here as a child who within seven days of a reliable hearing level determination, was examined by one of three study otolaryngologists at the school test site and reported not to exhibit any of the following physical signs in either ear: (a) congenital malformation of the pinna, auditory canal or tympanic membrane; (b) operative scar, adenopathy or fistula in the auricular region; (c) occlusion of the auditory canal resulting in less than satisfactory visibility of the tympanic membrane; (d) abnormal coloration, increased vascularization, bulging, retraction, scarring, impaired mobility or perforation of the tympanic membrane; (e) calcium plaques on the

SELECTED PERCENTILES OF THE DISTRIBUTION OF HEARING LEVELS OF CHILDREN IN OTOLOGICALLY "NORMAL" AND "ABNORMAL" POPULATIONS TESTED BETWEEN JUNE 1958 AND JUNE 1959 BY FREQUENCY AND EAR

(HEARING LEVELS IN DECIBELS re AUDIOMETRIC ZERO, AMERICAN STANDARD)



NOTE: Between the 2.5 th percentile (upper line) and the 97.5 th percentile (lower line) are included 95 percent of the hearing levels of the children tested.

FIG. 1—Selected percentiles of the distribution of hearing levels of children in otologically "normal" and "abnormal" populations tested between June 1958 and June 1959 by frequency and ear.

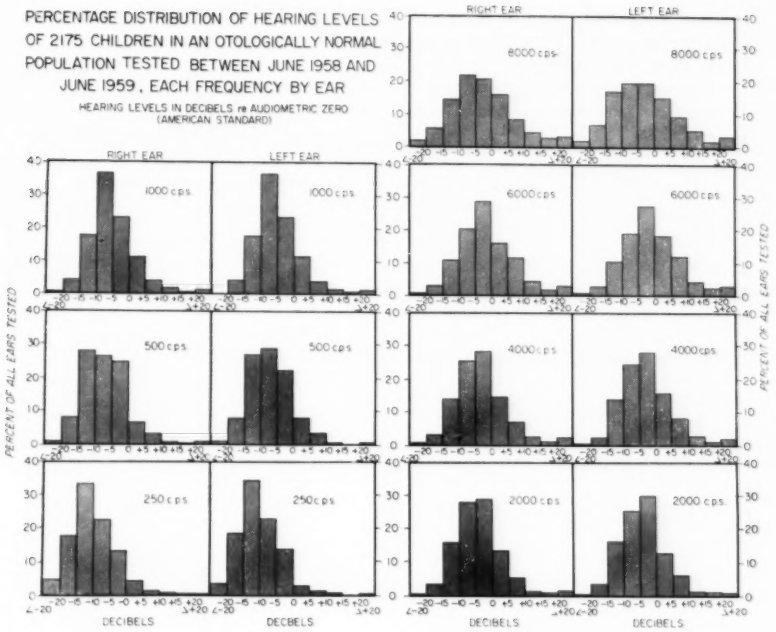

PERCENTAGE DISTRIBUTION OF HEARING LEVELS OF 2175 CHILDREN IN AN OTOLOGICALLY NORMAL POPULATION TESTED BETWEEN JUNE 1958 AND JUNE 1959, EACH FREQUENCY BY EAR
HEARING LEVELS IN DECIBELS re AUDIOMETRIC ZERO (AMERICAN STANDARD)
RIGHT EAR
LEFT EAR
8000 cps
1000 cps
6000 cps
500 cps
4000 cps
250 cps
2000 cps
PERCENT OF ALL EARS TESTED
DECIBELS

FIG. 2—Percentage distribution of hearing levels of 2,175 children in an otologically normal population tested between June 1958 and June 1959, each frequency by ear.

tympanic membrane; (f) discharge from the middle ear; (g) cholesteatoma; or (h) tumor of the middle ear.

Of the 3,019 children who had concurrent otologic examinations and a reliable hearing level determination during the first study year, 2,175 were judged to be otologically normal, and 457 were found to have one or another of the physical abnormalities listed above. In addition, the examination of 387 children could not be completed because of cerumen in the auditory canals.

The mean and median hearing levels and the standard deviations for the groups of otologically normal and abnormal children are shown in table IX. The mean hearing levels in the abnormal group are less sensitive than those in the normal group, the differences varying by frequency and ranging from 4 to 6 decibels. The median hearing levels are also less sensitive in the abnormal group than in normal children, but the differences in this instance range from 2 to 4 decibels by frequency. The standard deviations of both groups of children become larger as the frequencies rise. It is felt that this is due to the greater variability of response to pure tones at the higher frequencies.

The wider ranges of hearing levels in the otologically abnormal children are reflected in the greater standard deviations for this group. The ranges of hearing levels by ear and frequency, for both normal and abnormal groups of children, are represented graphically in figure 1, as selected percentiles of the dis-

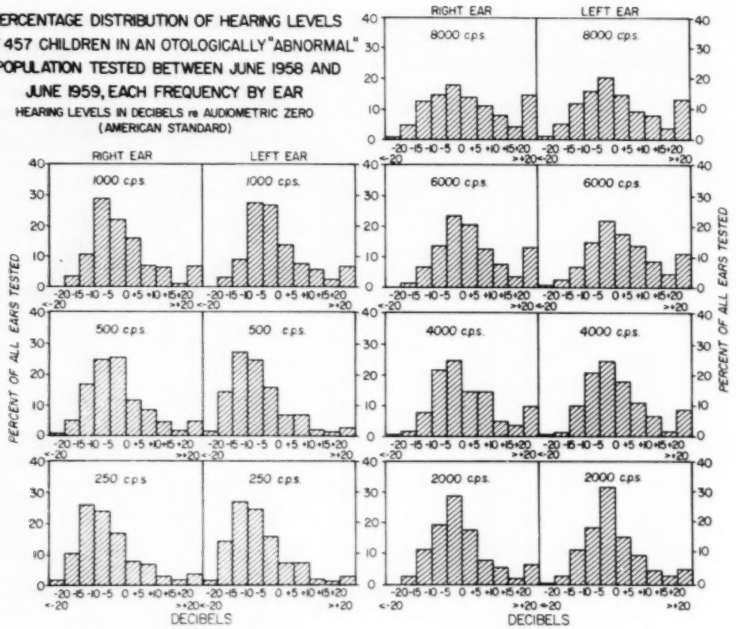

PERCENTAGE DISTRIBUTION OF HEARING LEVELS OF 457 CHILDREN IN AN OTOLOGICALLY "ABNORMAL" POPULATION TESTED BETWEEN JUNE 1958 AND JUNE 1959, EACH FREQUENCY BY EAR
HEARING LEVELS IN DECIBELS re AUDIOMETRIC ZERO (AMERICAN STANDARD)
RIGHT EAR
LEFT EAR
8000 cps.
1000 cps.
6000 cps.
500 cps.
4000 cps.
250 cps.
2000 cps.
PERCENT OF ALL EARS TESTED
DECIBELS

FIG. 3—Percentage distribution of hearing levels of 457 children in an otologically "abnormal" population tested between June 1958 and June 1959, each frequency by ear.

tribution of hearing levels about the medians.

Figures 2 and 3 illustrate the percentage distribution of hearing levels for the otologically normal and abnormal children, respectively. It is to be noted that the modal classes are similar for both groups.

Our data confirm the fact that the majority of children with an otological abnormality do not have gross deviation in hearing sensitivity. Therefore, when all children with any otological abnormality are looked at as a group, the hearing sensitivity variations which do exist in some of them will not produce a striking shift in the mean, the median or the mode of the group. By further longitudinal observation this study aims at identifying patterns, "profiles" or combinations of experiences of history and findings which will distinguish the children who are candidates for hearing trouble.

At 8000 cps, 65 per cent of the otologically normal children have hearing levels below audiometric zero. This percentage increases as the frequencies drop until at 250 cps, 92 per cent have hearing levels below zero. Even in the otologically abnormal children, 50 per cent have hearing levels below audiometric zero at 8000 cps, and 80 per cent at 250 cps. It is of interest that the percentage of children with otologic abnormalities who have hearing levels less sensitive than 15 decibels above audiometric zero (a commonly used screening level) is approxi-

MEAN HEARING LEVELS OF 2175 CHILDREN AGED 5-14 YEARS IN AN OTOLOGICALLY NORMAL POPULATION TESTED BETWEEN JUNE 1958 AND JUNE 1959 EACH FREQUENCY BY EAR

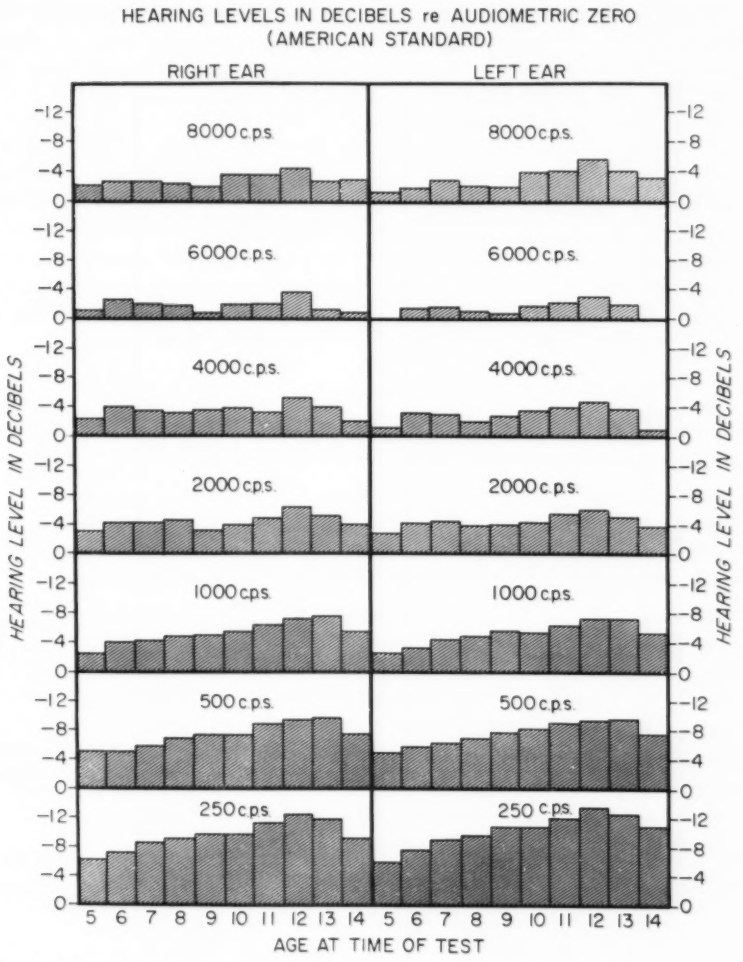


FIG. 4—Mean hearing levels of 2,175 children aged 5 to 14 years in an otologically normal population tested between June 1958 and June 1959, each frequency by ear.

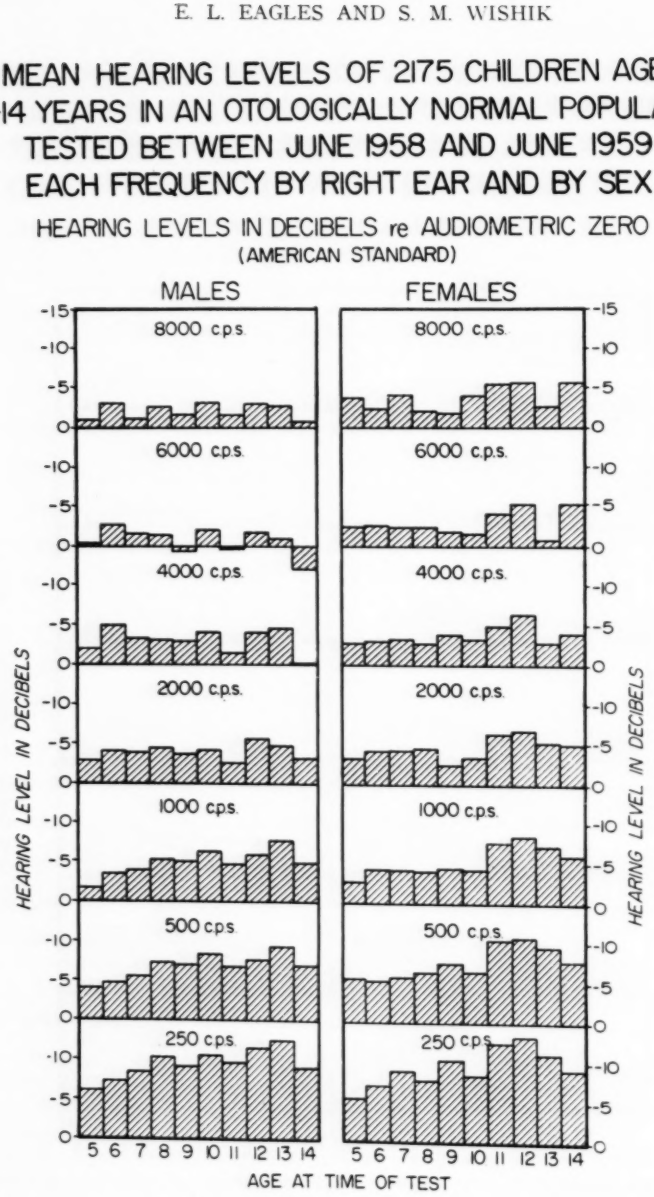

MEAN HEARING LEVELS OF 2175 CHILDREN AGED 5-14 YEARS IN AN OTOLOGICALLY NORMAL POPULATION TESTED BETWEEN JUNE 1958 AND JUNE 1959 EACH FREQUENCY BY RIGHT EAR AND BY SEX
HEARING LEVELS IN DECIBELS re AUDIOMETRIC ZERO (AMERICAN STANDARD)
MALES
FEMALES
8000 c.p.s.
6000 c.p.s.
4000 c.p.s.
2000 c.p.s.
1000 c.p.s.
500 c.p.s.
250 c.p.s.
-15
-10
-5
0
HEARING LEVEL IN DECIBELS
5 6 7 8 9 10 11 12 13 14
AGE AT TIME OF TEST

FIG. 5—Mean hearing levels of 2,175 children aged 5 to 14 years in an otologically normal population tested between June 1958 and June 1959, each frequency by right ear and by sex.

mately 4 to 250 cps, and this percentage increases to 18 per cent at 8000 cps. No more than 10 per cent of the children with otologic abnormalities had hearing levels less sensitive than 15 decibels above audiometric zero in the speech range. These findings have strong implications in respect to the efficacy of audiometric screening for otologic defects.

The distribution of hearing levels by age in the otologically normal children is illustrated in figure 4. This distribution shows a trend of increasing sensitivity from 5 years of age to the greatest hearing sensitivity in those children who were 12 and 13 years at the time their hearing level was determined. This is followed by a decrease in sensitivity at ages 14 and 15. The reasons for this pattern are not understood at this stage of the analysis of the data and will be sought as the study progresses.

When the hearing levels in the otologically normal group are distributed by sex, it is seen that at 11 and 12 years of age, females show more sensitive hearing levels at all frequencies than males and, in the groups younger than these, the levels are similar for both sexes (fig. 5). Females show their most sensitive hearing levels at 12 years of age, while males show peak sensitivity later, at age 13.

STUDY OF RELATIONSHIPS BETWEEN EVENTS IN PAST MEDICAL HISTORY AND HEARING LEVELS

Information on a variety of items in the past medical history of all study children is being collected. For interest, a tabulation is presented showing numbers and percentages of positive reports in a total of 3,882 children during the first year of the study (table X). It is too early to attempt to make correlations or draw conclusions from them. The data emerging from a preliminary analysis of relationships between medical history events and hearing levels suggest that special attention be given to the following items: natal history; common childhood diseases in the first few years of life; certain more serious diseases, such as brain injury or infection; frequency of upper respiratory infection and allergy; and age of development of speech, among others.

SUMMARY

The paper gives a general description of the organization, conduct and preliminary findings of the initial study with which the Subcommittee on Hearing in Children has been concerned in order to meet its objectives.

The acoustic environment which must be attained if air conduction hearing levels are to be determined with accuracy has been described, and it has been proved that the environment can be attained in the field.

From experience in this study and from other sources it is known that many commercially available audiometers do not measure hearing levels with accuracy at the low levels at which many children hear. This problem in linearity was overcome.

Other problems in audiometer performances were also corrected in order that the study audiometers meet the American Standard Specification. However, in order to maintain this standard of audiometer performance, it was necessary to have comprehensive repair and calibration facilities which are not now commonly available throughout all areas of the country.

TABLE X

TABULATION OF EVENTS IN THE PAST MEDICAL HISTORY OF CHILDREN WHO HAD RELIABLE HEARING LEVEL DETERMINATIONS BETWEEN JUNE 1958 AND JUNE 1959

ITEM	NUMBER OF CHILDREN	PERCENT OF ALL CHILDREN
All Children	3882	100.0
Prenatal and Birth History		
Presence in Mother of:		
Kidney Disease	78	2.0
High Blood Pressure	164	4.2
German Measles	4	0.1
Other Acute Illness with Fever in First Trimester	44	1.1
Rh Factor Complication	24	0.6
Treatment with Streptomycin	11	0.3
Treatment with Quinine	22	0.6
Jaundice of Child	89	2.3
Blood Transfusion of Child	25	0.6
Injuries at Birth	70	1.8
Anoxia	7	0.2
Cephalhematoma	2	0.1
Trauma to Peripheral Nerves	4	0.1
Skeletal Fractures or Dislocations	10	0.3
Trauma to Soft Parts	41	1.1
Injury not Specified	6	0.2

ITEM	NUMBER OF CHILDREN	PERCENT OF ALL CHILDREN
All Children	3882	100.0
Days in the Hospital—Mother		
Not Hospitalized	204	5.3
0-5 Days	842	21.7
6-10 Days	2244	57.8
11-15 Days	336	8.7
16-20 Days	7	0.2
21 Days or More	21	0.5
Unknown	228	5.9
Days in the Hospital—Child		
Not Hospitalized	202	5.2
0-5 Days	790	20.4
6-10 Days	2163	55.7
11-15 Days	340	8.8
16-20 Days	14	0.4
21 Days or More	150	3.9
Unknown	223	5.7
Weight of Child at Birth		
Less than 4½ lbs.	105	2.7
4 lbs. 8 oz. to 8 lbs. 15 oz.	3281	84.5
9 lbs or more	244	6.3
Unknown	252	6.5

All Children	3882	100.0
Childhood Diseases		
Measles	2828	72.8
Under 3 Years	575	14.8
Over 3 Years	2112	54.4
Age Unknown	141	3.6
German Measles	877	22.6
Under 3 Years	133	3.4
Over 3 Years	676	17.4
Age Unknown	68	1.8
Mumps	1494	38.5
Under 3 Years	121	3.1
Over 3 Years	1272	32.8
Age Unknown	101	2.6
Scarlet Fever	152	3.9
Whooping Cough	649	16.7
Meningitis	21	0.5
Encephalitis	6	0.2
Epilepsy	16	0.4
Tuberculosis	6	0.2
Cerebral Palsy	8	0.2
Diphtheria	18	0.5
Chickenpox	2468	63.6
Under 3 Years	449	11.6
Over 3 Years	1897	48.9
Age Unknown	122	3.1
Severe Diarrhea Under 1 Year of Age	164	4.2

All Children	3882	100.0
Injuries and Operations		
Head Injury with Unconsciousness	113	2.9
Head Injury with Bleeding from Nose	104	2.7
Head Injury with Bleeding from Ears	30	0.8
Injuries to the Right Ear	30	0.8
One	29	0.8
Two	—	—
Three	1	*
Injuries to the Left Ear	45	1.2
One	42	1.1
Two	3	0.1
Tonsil and/or Adenoid Operation	1188	30.6
Mastoid Operation—Right	10	0.3
Mastoid Operation—Left	12	0.3
Sinus Operation	12	0.3
Ear Conditions and Respiratory Conditions During Lifetime		
Ear Aches	1647	42.4
Discharge from Ears	341	8.8
Eardrum Operation	125	3.2
Sore Throat with Fever	1524	39.3

*Less than 0.1 per cent

TABLE X (Continued)

ITEM	NUMBER OF CHILDREN	PERCENT OF ALL CHILDREN
All Children	3882	100.0
*Sore Throats with Fever in Past 12 Months**		
None	2190	56.4
1-2	928	23.9
3-4	390	10.0
5-8	100	2.6
9-12	18	0.5
13 or More	5	0.1
Number Not Stated	83	2.1
Unknown	168	4.3
*Colds in Past 12 Months**		
None	541	13.9
1-2	1633	42.1
3-4	1003	25.8
5-8	297	7.7
9-12	30	0.8
13 or More	5	0.1
Number Not Stated	205	5.3
Unknown	168	4.3
Current Ailments		
Sinus Trouble	249	6.4
Bronchitis	143	3.7
Dizziness	158	4.1
Ringing in Ears	137	3.5
Hay Fever	114	2.9
Asthma	87	2.2
Eczema	75	1.9
Hives	88	2.3
Allergy to Food	249	6.4

ITEM	NUMBER OF CHILDREN	PERCENT OF ALL CHILDREN
All Children	3882	100.0
Hard of Hearing		
Yes—Suspected	218	5.6
Yes—Dr. Said So	55	1.4
Consultations Regarding Speech		
Medical Doctor	115	3.0
Hearing Specialist	40	1.0
Speech Specialist	196	5.0
More Than One Type Consulted	43	1.1
Age First Spoke Single Words		
Before 8 months	330	8.5
8-10 months	918	23.6
11-14 months	1062	27.4
15 Months or Later	590	15.2
Unknown	982	25.3
Age First Spoke Words Together		
Before 13 months	341	8.8
13-15 months	674	17.4
16-18 months	785	20.2
19-23 months	183	4.7
2 Years to 2 Years 11 months	623	16.0
3 Years or Later	143	3.7
Unknown	1133	29.2
Hearing Impairment or Deafness in the Family		
Mother	168	4.3
Father	173	4.5
Brother or Sister	97	2.5
Grandparent	519	13.4

*Twelve-month period prior to the date the history was submitted.

Many of the precautions taken in regard to maintenance of acoustic environment and to audiometer performance and calibration would seem to apply not only for research purposes but also in many clinical situations and hearing measurement programs.

A norm or reference hearing level has been established for the total study population, and other baselines have also been calculated for children with and without otologic abnormalities. The normative data presented are significantly lower than the reference level in current use. There is also a clear indication that audiometric screening levels commonly used, for example, at 15 decibels above the American Standard audiometric zero, will screen out only a relatively small percentage of children with demonstrable otologic abnormalities. The missed cases will include both active and inactive pathologic conditions. That active pathologic conditions need treatment is self-evident, but once the condition has become inactive, medical supervision and guidance are still needed in varying degree and for different periods of time. Audiometry, as one of the methods of identifying ear problems needing medical attention, has stringent demands put

upon it in respect to acoustic environment, equipment, and personnel.

It is of prime importance to recognize the low levels at which most children hear and to realize that a child can have a marked decrease in hearing sensitivity, possibly indicative of underlying pathologic changes, without the decrease being detected by usual identification audiometry. If we are to detect early the child with initial decrease in hearing sensitivity and thus be in a better position to prevent hearing loss and conserve hearing, we must have sufficiently refined baseline from which to measure decreases in sensitivity and we cannot be satisfied with identifying such children only after a hearing loss has become gross or handicapping.

Certain of the findings, such as otological conditions and events in the medical history associated with variations in hearing sensitivity, have been studied by cross-sectional analysis of data collected during the first year of the study. While a more complete understanding of the significance of these associations must await study over a period of time, they give clues to factors that may have predictive value in indicating danger of hearing impairment and will, therefore, receive close attention as the study proceeds.

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A STUDY OF HEARING IN CHILDREN

II. Acoustic Environment and Audiometer Performance

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FOR several years, the American Academy of Ophthalmology and Otolaryngology, through its Subcommittee on Hearing in Children of the Committee on Conservation of Hearing, has been concerned with a long-term, nationwide study of hearing problems in children. An initial study is being conducted in Pittsburgh, through the cooperation of the Subcommittee with the Maternal and Child Health Section of the University of Pittsburgh's Graduate School of Public Health, to evaluate methods for the testing of hearing in children in order to decide which are more efficient, economical, and valid in terms of time and manpower, and to evaluate and define medical signs and symptoms which may indicate danger of hearing impairment. A significant outcome of the study will be the development of the methods and techniques for the Subcommittee's national studies.

The initial study, which is planned for a five-year period, is being conducted on a population of approximately 5,000 children ranging in age from three to 15 years. The school-age portion of this population is 97.5 per cent of the enrollment of four public schools. The preschool children are those who are expected eventually to attend the four study schools. The four schools were chosen to be representative, as a group, of the general Pittsburgh public school population from a socioeconomic standpoint.

Individual air-conduction hearing levels are being determined and otological examinations made on the children at varying intervals. Medical histories have been obtained. The relations among otological findings, medical histories, air-conduction hearing levels, academic achievement, and other aspects of child development are being studied.

A prime objective of the Study of Hearing in Children is to obtain information on hearing levels by determining individual air-conduction hearing levels. It was felt that these hearing levels were substantially better than adult norms, and to measure them accurately it was necessary to have both the proper acoustic environment and audiometers which would test with linearity to 30 db below the American Standard audiometric zero. This paper presents the solutions to problems encountered in connection with the acoustic environment and with the audiometers.

ACOUSTIC ENVIRONMENT

The choice of audiometric test rooms was made after an investigation of the various types of rooms commercially available and after a study of their construction and attenuation characteristics.

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Double-wall rooms were selected because single-wall rooms did not provide sufficient attenuation of ambient noise, particularly for testing at low frequencies.

The audiometric test rooms used in the Pittsburgh Study are prefabricated, portable rooms* which were erected in rooms set aside for this purpose in Pittsburgh schools, after acoustic surveys showed that the sites were relatively quiet areas. Each test room is actually a room within a room with an air space between two separate housings; the inner room rests on rubber vibration insulators while the outer room rests on the area floor. Walls and ceilings of both inner and outer rooms are constructed of 4-inch thick acoustic panels. The test rooms have two adjacent separately hinged doors that open in opposite directions. Each room contains a double-glazed window, is lighted by an incandescent light and has continuous ventilation. The inside measurements of the rooms are 72 inches by 64 inches. Outside measurements are 96 inches by 88 inches. The weight is approximately 6,225 pounds.

Before the audiometric test rooms were chosen, advice was sought regarding the sound pressure levels which must not be exceeded in the audiometric test rooms if hearing levels of children well below audiometric zero (American Standard) were to be determined without masking. The maximum allowable sound pressure levels in order to test at 30 db below the American Standard audiometric zero[1,2] are listed by octave band in table I.

Acoustic surveys were made at the sites chosen in the four study schools, both before and at periodic intervals after the erection of the audiometric test rooms. In table I, the results of a recent survey in one school are summarized. The findings in this survey, which was made after the rooms had been in use over a year, are typical of the conditions found at the remaining three study sites. During the acoustic surveys, sound pressure levels were recorded both inside and outside the audiometric test rooms. The sound pressure levels recorded in table I were the highest noted during test periods which were chosen to include periods of peak noise during the school day. The 150 to 300 cps octave band was of particular concern, since the lowest test frequency was 250 cps. When the attenuating effect of the earphones is added, it can be seen that there is a margin of safety even in the 150 to 300 cps octave band, which allows the determination of hearing levels to 30 db below audiometric zero.*

AUDIOMETERS

Two methods were considered for dealing with the problem of determining hearing levels with linearity below audiometric zero. The first was to construct audiometers which would test to the required levels. Highly accurate laboratory type audiometers could be built, but this would be costly and time consuming. In addition, there was the question of whether a commercially available audiometer could be made to serve the purposes of the study. A plan for building special audiometers was, therefore, not developed. The second method considered, and adopted, was to obtain

*Model 1202, by Industrial Acoustics Co., 341 Jackson Ave., New York 54, N. Y.

*Sound level measurements were made by a General Radio Octave Band Analyzer, type number 1550-A, used in conjunction with a General Radio Sound Level Meter, type number 1551-A. Both instruments were calibrated in the Acoustics Laboratory of the Graduate School of Public Health and were found to meet the American Standard Specification for instruments of this type.

TABLE I

Sound pressure levels (in decibels re 0.0002 dyne/cm² as measured in octave bands listed) recorded during acoustic survey at H. C. Frick School, September 15, 1959. Recording was done both outside and inside the audiometric test room and under varying noise conditions: with hall door closed and open, with test room ventilator on and off, with and without conversation in the room, during lunch period, and during change of classes. Given below also, for purposes of comparison, are the maximum allowable sound pressure levels (SPL) to determine hearing levels at 30 decibels below audiometric zero with no masking.

	OCTAVE BANDS (IN CPS)							
20 TO 10,000	20 TO 75	75 TO 150	150 TO 300	300 TO 600	600 TO 1,200	1,200 TO 2,400	2,400 TO 4,800	4,800 TO 10,000
Outside Test Room								
62	58	54	54	48	42	38	34	28
(hall door closed, ventilator on, conversation)								
58	55	54	48	43	33	36	32	30
(hall door closed, ventilator on, no conversation)								
58	54	52	50	52	46	50	48	30
(hall door closed, ventilator on, lunch hour)								
58	50	55	54	54	51	44	38	36
(hall door open, ventilator off, conversation)								
Inside Test Room, Test Room Door Closed								
43	44	30	11	8	8	9	9	13
(hall door open, ventilator on)								
46	44	24	7	8	8	9	10	13
(hall door closed, ventilator off, classes changing)								
48	49	38	11	9	8	8	9	13
(hall door closed, ventilator off, lunch hour)								
44	46	29	10	8	7	8	9	14
(hall door closed, ventilator off)								
Maximum Allowable SPL								
		10	10	10	10	12	22	32

five commercially available audiometers constructed with auxiliary 40 db precision attenuators placed in the earphone lines. These attenuators could be switched in or out of the circuit and would be switched in on the linear portion of the attenuator scale so that low hearing levels could be measured accurately.

An audiometer manufacturing company, which constructed audiometers as described, guaranteed them to meet the American Standard Specification. A significant feature of the audiometers was their Western Electric 705-A earphones for which the threshold characteristics are known. The audiometers were not required to provide masking or bone con-

duction. The frequencies supplied were 250, 500, 1,000, 2,000, 4,000, 6,000, and 8,000 cps. The hearing level dials were graduated in 5 db steps from zero to 60 db. The audiometers were of a type that is widely used throughout the country and are produced by a company that cooperated to the fullest extent in complying with its guarantee that the audiometers meet the American Standard Specification. It is emphasized that the experience with audiometer performance, as described on the following pages, is not unique to the make of audiometer used in the study.

AUDIOMETER PERFORMANCE

Performance at Initial Calibration

First attempts to check the calibration data supplied by the manufacturer against the physical performance of the audiometers were unsuccessful. At this time, the Acoustics Laboratory at the University of Pittsburgh was in the process of development and not able to calibrate the audiometers. A portable artificial ear, which is available commercially, was used instead. The artificial ear was found to have an unstable microphone and not to meet the American Standard Specification. Advice and help was then obtained from the Sound Section of the National Bureau of Standards.

The audiometers failed to meet the American Standard Specification in the following aspects:

> interrupter click on termination of tone; acoustic radiation from audiometer chassis; intensity and frequency changes at onset and termination of signal tone; extraneous signals at certain frequencies; erratic earphone response; frequencies outside the 5 per cent tolerance of the American Standard Specification; rms sound pressure errors of certain earphones greater than the tolerance limits of 4.0 db at the test frequency of 2,000 cps and lower, and 5.0 db at the test frequencies above 2,000 cps; variation in the sound pressure output greater than 2 db as specified in the American Standard Specification when line voltage was varied from 105 to 125 volts; tone interrupter showing rise and decay times of tones outside of specifications; overshoot of tone outside specifications; attenuator linearity outside the tolerance limit of ± 1.5 db at 10 to 5, and 5 to 0 steps; and tests of purity of test tones showing the sound pressure levels of the fundamental to be less than 25 db above any harmonic at certain frequencies.

Not all of these faults were found in each audiometer. However, none of the five met all specifications at the first calibration, and were returned to the manufacturer for repair or correction or for replacement of unstable earphones. After correction, the audiometers were sent to the Bureau of Standards for their second calibration. At this time, one audiometer was found to be within specifications and went into use in the study in Pittsburgh. The remaining four audiometers were again returned to the manufacturer for further changes and then were sent to the Bureau of Standards for the third calibration. Three audiometers met specifications at the third calibration. The fifth audiometer was again returned to the manufacturer for correction and was finally received in June 1958 and was found to meet the American Standard Specification. A sixth audiometer was purchased later as a spare.

The difficulties experienced in getting the audiometers to meet the American Standard Specification involved a period of five months, and demonstrated the need for comprehensive calibration and repair facilities which would be easily and quickly available. The Department of Occupational Health of the Graduate School of Public Health expanded its Acoustics Laboratory so that by the time

the audiometers were ready for use the laboratory was fully equipped to carry out artificial ear calibration of audiometers. Periodic calibration of the hearing study audiometers was then established.

Performance Following Initial Calibration

The audiometers were calibrated as often as possible until sufficient information was available to judge their stability. Beginning in July 1958, 45 complete calibrations were done on six audiometers through July, August, and September. During this period, two of the audiometers were out of operation for several weeks at a time while unstable earphones were replaced. Therefore, an average of three calibrations per month was performed on each audiometer in operation during the three months. In October the interval between calibrations was lengthened to two weeks, and in November to one month. As a result of this experience, the interval between calibrations was set not to exceed one month unless the performance of the audiometer indicated the need for more frequent calibration. Necessary servicing of the audiometers was carried out at the time of calibration so that the American Standard Specification was consistently maintained at all times when the audiometers were in use.

In addition to the monthly acoustic calibration, the audiometers received daily checks by the technicians. Beginning in January 1959, a weekly measurement of the voltage output of the audiometers at the terminals of the earphones was instituted. This measurement is carried out at the site where the audiometer is used. A series of measurements established a baseline of output readings for each frequency. Variation of plus or minus 2 db from this baseline on two successive days was taken to indicate the need for an acoustic calibration.

Problems in Tone Presentation. The most serious problem in performance of the audiometers was delay in rise and decay times of the tone presentation, and overshoot and undershoot of tone. The difficulty arose from the fact that the tone in the audiometers was interrupted by the starting and stopping of a Wien bridge oscillator. All of the audiometers met the American Standard Specification at the start of the study but were close to the tolerance limit in respect to rise time of tone presentation. Overshoot of tone beyond the required plus or minus 1 db of the required sound pressure was sufficient to place one audiometer out of operation early in the study. The remaining audiometers showed overshoot which tended to increase with the passage of time.

The problem of delay in tone presentation, and of overshoot and undershoot was finally solved by the staff of the Acoustics Laboratory. To correct the difficulty, the audiometers were modified by introducing tone interruption through a separate electronic switch placed between the oscillator and the output. By this method the oscillator is left on all the time that the audiometer is turned on and interruption is accomplished by the electronic switch. The need to operate the oscillator continuously introduced a number of electronic problems which did not exist when the tone was interrupted by stopping the oscillator. These problems were associated with a strong leak-through of tone due to stray wiring capacitance, and with the location of the audiometer components. This last was eliminated only after modification of the audiometer circuits to the extent that the output transformer was removed from its location and mounted elsewhere on the chassis.

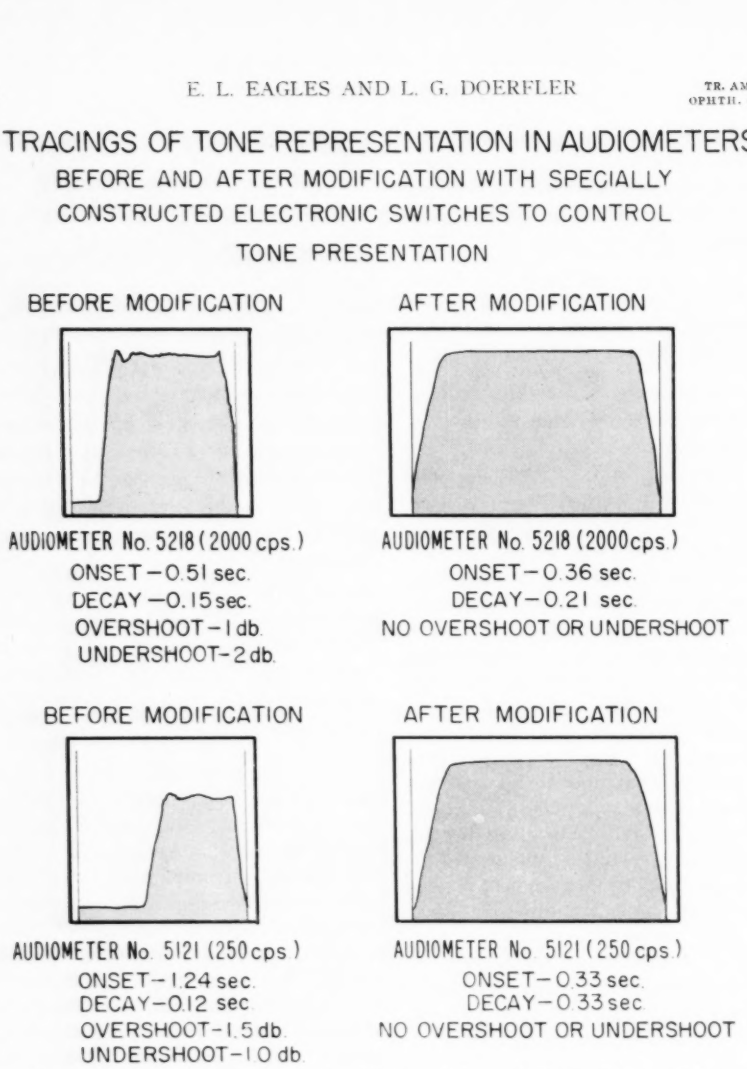

FIG. 1—Tracings of tone representation in audiometers before and after modification with specially constructed electronic switches to control tone presentation.

These changes have resulted in a smooth tone where the duration of onset is approximately 0.3 sec. Furthermore, there is no discernible overshoot or undershoot. Tracings of the tone presentation before and after tone modification are shown in figure 1.

Other Major Defects. The major defects in performance of the six audiometers, occurring during the 21-month period from July 1, 1958, to March 31, 1960, in addition to that of tone presentation, are listed herewith:

DEFECT IN PERFORMANCE	NUMBER OF TIMES OF OCCURRENCE
Sound Pressure Output Approaching or Exceeding Tolerance Limits	45
Faulty Earphone Performance	10
Earphone Replaced Due to Performance	6
Frequency Outside 5% Tolerance	8
Harmonic Distortion	7
Extraneous Instrument Noise	4
Worn Interrupter Switch	2
Defect in 40 db Attenuator	4
Defect in Electronic Switch	1

From this tabulation it can be seen that the most common defect in performance was the tendency of the audiometers to produce sound pressure errors greater than the tolerance limits of 4.0 db at the test frequency of 2,000 cps and lower, and 5.0 db at the frequencies above 2,000 cps. This defect occurred 45 times in all six audiometers. The smallest number of occasions on which it occurred in any one audiometer was three times, and the greatest, 13 times.

The sound pressure output of one audiometer is illustrated in figure 2, for the period July 1, 1958, to May 30, 1959, during which time it was necessary to readjust the audiometer on seven occasions. In the figure, each break in the lines representing the output of the earphones indicates one of the occasions on which readjustment or repair was made at one or more frequencies. In this connection, it should be mentioned that the audiometers were brought into specifications when the sound pressure errors drifted close to the tolerance limits. It is not known how far they would have drifted outside the tolerance limits if the audiometers had not been readjusted.

Not all audiometers behaved in the same manner in respect to output. During the 21-month period previously mentioned, the longest continuous periods each audiometer remained within specifications were: one for eight months, one for five months, one for four months, two for three months, and the sixth audiometer stayed within the specification at no time longer than two months.

Faulty earphone performance necessitating the replacement of earphones on six occasions was the next most frequent problem. On eight occasions, frequencies were outside the 5 per cent tolerance in two of the audiometers. Excessive harmonic distortion occurred on one occasion in each audiometer and on two occasions in one audiometer at 500 and 8,000 cps. These occasions followed closely after the previously described modification of the audiometers to correct the defects in tone presentation.

The audiometers remained relatively stable in respect to the 5 db hearing loss intervals or attenuator steps, varying not more than plus or minus 1.5 db at each interval. The cumulative tendency in each audiometer was for the intervals to be less than the 5 db step so that the range from 0 to 60 db was actually not 60 db but usually closer to 55 db.

The 40 db attenuators also remained relatively constant, although each of the six actually attenuated 39 db or slightly less. With the use of these attenuators switched into the circuit at an attenuator dial reading of zero, the audiometers had a range of attenuation from 60 db above audiometric zero to 40 db below, as far as dial settings were concerned, but actually the ranges were 6 to 8 db less than this.

In summary, the following audiometer components produced variations or errors which influenced the hearing levels recorded at each threshold determination: (a) the 40 db attenuators in the

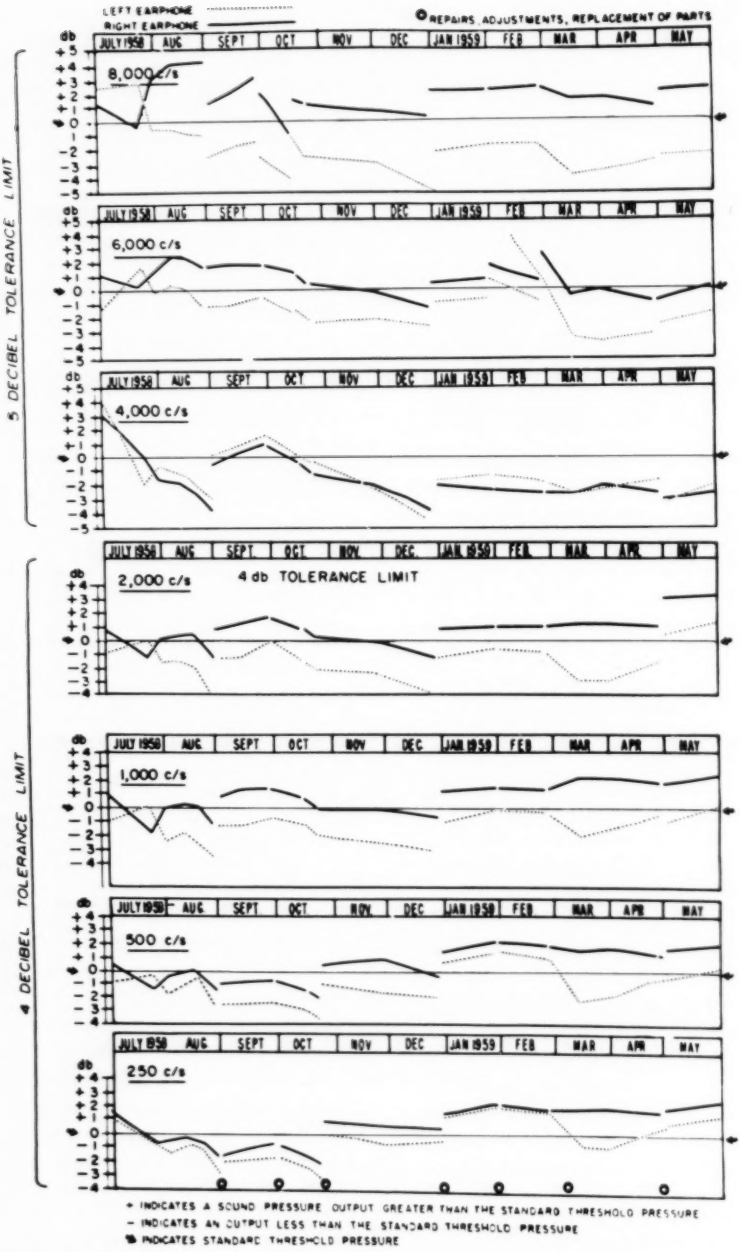
LEFT EARPHONE
RIGHT EARPHONE
REPAIRS ADJUSTMENTS, REPLACEMENT OF PARTS
JULY 1958 AUG SEPT OCT NOV DEC JAN 1959 FEB MAR APR MAY
8,000 c/s
6,000 c/s
4,000 c/s
2,000 c/s
4 db TOLERANCE LIMIT
1,000 c/s
500 c/s
250 c/s
5 DECIBEL TOLERANCE LIMIT
4 DECIBEL TOLERANCE LIMIT
+ INDICATES A SOUND PRESSURE OUTPUT GREATER THAN THE STANDARD THRESHOLD PRESSURE
– INDICATES AN OUTPUT LESS THAN THE STANDARD THRESHOLD PRESSURE
INDICATES STANDARD THRESHOLD PRESSURE

FIG. 2—Sound pressure errors determined during acoustic calibrations of audiometer no. 5211, showing variation from standard threshold pressures by earphone, by frequency, and by time. Each break in the output lines indicates one of the occasions on which readjustment or repair was made at one or more frequencies.

earphone lines, a relatively constant variation; (b) the 5 db attenuator steps, relatively constant variations; and (c) the sound pressure output at the various frequencies, errors which varied with time, frequency, earphone, and with audiometer.

Following are examples of the magnitude of errors in these three components for two adjacent calibrations in one audiometer: the average error in the 40 db attenuator equalled 1.6 db; the average error at the 5 db attenuator steps varied at each respective step and ranged from 0.0 db to 1.4 db; the sound pressure output showed average errors by frequency ranging from —1.0 db to +3.8 db in the right earphone and from —4.1 db to +1.4 db in the left earphone.

When these three variations or errors were added algebraically to the results obtained in hearing level determinations, it was found that in some instances as much as a 5 or 10 db shift was obtained in a reading at a particular frequency. In other instances, no change occurred in a recorded reading. Table II is presented to show an example of the magnitude and direction of the combined errors when the average errors in the 40 db attenuator, attenuator (hearing-level dial) steps, and the sound pressure output of each earphone are added algebraically. The variations by hearing level, frequency, and by earphone, in this instance, have a range of approximately 10 db.

CORRECTION OF READINGS

Because of the magnitude of error as shown in table II, the readings obtained in hearing level determinations were corrected first by the appropriate exact numerical error. However, this involved adding an exact error to a relatively gross measurement of hearing level obtained in 5 db steps. Thus, individuals who hear a particular frequency at 10 db and who do not hear at 5 db are recorded as having thresholds of 10 db but actually they may be able to hear at the 6, 7, 8, or 9 db level. If it is assumed that of all individuals with hearing levels recorded as 10 db an equal number begin to hear at each point between 5 and 10 db, then the whole group, although recorded as having a hearing level of 10 db, actually had an average hearing level of 7.5 db. Thus the hearing levels, as determined, may underestimate the hearing levels for the group by 2.5 db. Because of this, it was felt that the hearing levels could be made more exact, although still approximations, by subtracting 2.5 db from each hearing level determination. With this second adjustment, the addition of the exact numerical error as described above becomes more realistic. A further adjustment was the rounding off of the resultant hearing level value to the nearest whole number.

Tables of adjusted and corrected values were computed for each month of the study, for both earphones of each audiometer, by frequency, and for each possible attenuator dial reading. The computation of adjusted and corrected values for a particular month is made by averaging the total error obtained from the calibration at the start of that month with the error obtained at the start of the following month. In those months in which there were calibrations in addition to the monthly calibration, a weighted average is calculated. In computing this average, adjacent calibration results are averaged and weighted by the number of days between the calibrations.

Tables III, IV, and V are presented to show the differences between the readings obtained by correcting the hearing levels as described, and what the

TABLE II

Combined Average Errors from the 40 db attenuator, the 5 db attenuator steps, and sound pressure output for each earphone for the period March 16 to 30, 1959, for audiometer no. 5121.

HEARING LEVEL (IN DB)	FREQUENCY 250	500	1,000	2,000	4,000	6,000	8,000
Right Earphone							
—20	4.6	4.9	6.6	2.0	5.6	4.4	1.9
—15	4.6	4.9	6.6	2.0	5.6	4.4	1.9
—10	4.2	4.5	6.2	1.6	5.2	4.0	1.5
— 5	4.4	4.7	6.4	1.8	5.4	4.2	1.7
0	4.0	4.4	6.1	1.5	5.0	3.8	1.4
5	4.2	4.5	6.2	1.6	5.2	4.0	1.5
10	3.8	4.2	6.0	1.4	4.8	3.6	1.2
15	3.8	4.2	5.9	1.3	4.8	3.6	1.2
20	3.2	3.5	5.2	0.6	4.2	3.0	0.5
25	3.0	3.4	5.1	0.5	4.0	2.8	0.4
30	2.6	3.0	4.7	0.1	3.6	2.4	0.0
35	2.8	3.2	4.9	0.3	3.8	2.6	0.2
40	2.4	2.8	4.6	0.0	3.4	2.2	—0.2
45	2.6	3.0	4.7	0.1	3.6	2.4	0.0
50	2.3	2.6	4.4	—0.2	3.3	2.1	—0.4
55	2.2	2.6	4.4	—0.2	3.2	2.0	—0.4
60	1.6	2.0	3.7	—0.9	2.6	1.4	—1.0
Left Earphone							
—20	0.6	1.4	3.4	0.0	4.4	3.5	—1.2
—15	0.6	1.4	3.4	0.0	4.4	3.5	—1.2
—10	0.2	1.0	3.0	—0.4	4.0	3.1	—1.6
— 5	0.4	1.2	3.2	—0.2	4.2	3.3	—1.4
0	0.1	0.9	2.8	—0.6	3.8	3.0	—1.7
5	0.2	1.0	3.0	—0.4	4.0	3.1	—1.6
10	0.0	0.8	2.6	—0.7	3.6	2.8	—1.8
15	—0.1	0.7	2.6	—0.8	3.6	2.8	—1.9
20	—0.8	0.0	2.0	—1.4	3.0	2.8	—2.6
25	—0.9	—0.1	1.8	—1.6	2.8	2.1	—2.7
30	—1.3	—0.5	1.4	—2.0	2.4	1.6	—3.1
35	—1.1	—0.3	1.6	—1.8	2.6	1.8	—2.9
40	—1.4	—0.6	1.2	—2.1	2.2	1.4	—3.2
45	—1.3	—0.5	1.4	—2.0	2.4	1.6	—3.1
50	—1.6	—0.8	1.1	—2.2	2.1	1.2	—3.4
55	—1.6	—0.8	—1.0	—2.3	2.0	1.2	—3.4
60	—2.3	—1.5	0.4	—3.0	1.4	0.6	—4.1

readings would have been if they had remained uncorrected. These differences in mean hearing levels have been computed for selected frequencies of 250, 1,000, 4,000, and 8,000 cps.

In table III, for the right ear it can be seen that the differences in hearing levels measured by audiometer No. 5,040 range by frequency from 0.5 to 1.3 db, and by audiometer No. 5,211 from

TABLE III

Difference (in db re audiometric zero) between corrected and uncorrected mean hearing levels (mean hearing levels based upon results of all reliable audiometric tests conducted during the given time period) for right and left ears at selected frequencies for each audiometer used between June 1958 and June 1959. Uncorrected hearing levels are those obtained from the dial readings of the 5 db attenuator in the normal course of testing. Corrected hearing levels are obtained by adding, to the uncorrected result, the sum of the errors inherent in the output of the earphone, the 5 db attenuator steps, and the 40 db attenuator.

AUDIOMETER	EARS	NUMBER OF EARS TESTED				CORRECTED, UNCORRECTED DIFF.			
		250 CPS	1,000 CPS	4,000 CPS	8,000 CPS	250 CPS	1,000 CPS	4,000 CPS	8,000 CPS
All	Right	6340	6740	6739	6285	2.3	1.8	2.1	1.8
	Left	6338	6741	6739	6285	3.2	2.8	2.2	2.0
No. 5040	Right	623	671	671	615	1.0	1.0	1.3	0.5
	Left	624	671	671	615	1.8	3.4	1.9	0.5
No. 5121	Right	1011	1058	1056	1003	3.9	2.7	4.2	4.0
	Left	1011	1058	1057	1003	3.7	3.6	2.2	0.7
No. 5148	Right	1159	1300	1300	1147	1.7	1.7	3.1	0.7
	Left	1157	1300	1299	1147	3.6	3.3	2.7	4.0
No. 5211	Right	1193	1218	1219	1191	3.9	3.9	0.7	4.5
	Left	1193	1219	1219	1191	2.3	3.5	1.3	0.3
No. 5218	Right	1063	1152	1152	1053	1.3	1.3	1.8	0.9
	Left	1062	1152	1152	1053	2.6	2.4	2.8	3.5
No. 5226	Right	1291	1341	1341	1276	1.6	0.1	1.2	—0.2
	Left	1291	1341	1341	1276	4.1	1.0	2.4	2.4

TABLE IV

Differences (in db re audiometric zero) between corrected and uncorrected mean hearing levels (mean hearing levels are based upon the results of all reliable audiometric tests conducted during the given time period) for right ears at selected frequencies for each month between June 1958 and June 1959. Uncorrected hearing levels are those obtained from the dial readings of the 5 db attenuator in the normal course of testing. Corrected hearing levels are obtained by adding, to the uncorrected results, the sum of the errors inherent in the output of the earphone, the 5 db attenuator steps, and the 40 db attenuator.

PERIOD OF TIME	NUMBER OF EARS TESTED				CORRECTED, UNCORRECTED DIFF.			
	250 CPS	1,000 CPS	4,000 CPS	8,000 CPS	250 CPS	1,000 CPS	4,000 CPS	8,000 CPS
June 1958 to June 1959	6340	6740	6739	6285	2.3	1.8	2.1	1.8
June 1958	390	470	470	390	2.5	1.3	3.4	5.9
July 1958	443	587	587	440	1.6	0.8	2.6	4.5
August 1958	514	640	640	513	1.2	0.6	1.2	3.6
September 1958	389	394	394	388	1.1	1.5	1.7	1.8
October 1958	408	408	408	408	1.6	1.9	2.5	1.5
November 1958	367	368	368	367	1.4	1.1	0.8	0.7
December 1958	561	561	561	561	1.4	1.2	0.2	0.3
January 1959	547	561	561	532	2.8	2.3	0.4	2.2
February 1959	614	618	618	600	2.1	1.5	0.8	1.2
March 1959	302	304	303	300	1.6	2.2	1.9	—0.8
April 1959	767	778	779	761	2.4	2.4	2.4	1.0
May 1959	636	642	641	626	4.6	3.4	4.9	0.8
June 1959	402	409	409	399	4.8	3.7	3.7	1.2

TABLE V

Differences (in db re audiometric zero) between corrected and uncorrected mean hearing levels (mean hearing levels are based upon the results of all reliable audiometric tests conducted during the given time period) for left ears at selected frequencies for each month between June 1958 and June 1959. Uncorrected hearing levels are those obtained from the dial readings of the 5 db attenuator in the normal course of testing. Corrected hearing levels are obtained by adding, to the uncorrected results, the sum of the errors inherent in the output of the earphone, the 5 db attenuator steps, and the 40 db attenuator.

PERIOD OF TIME	NUMBER OF EARS TESTED				CORRECTED, UNCORRECTED DIFF.			
	250 CPS	1,000 CPS	4,000 CPS	8,000 CPS	250 CPS	1,000 CPS	4,000 CPS	8,000 CPS
June 1958 to June 1959	6338	6741	6739	6285	3.2	2.8	2.2	2.0
June 1958	390	470	469	389	2.6	3.6	3.4	5.5
July 1958	443	587	587	441	3.1	3.6	2.4	4.4
August 1958	514	640	640	513	3.6	3.9	1.8	4.1
September 1958	389	394	394	388	3.5	2.6	2.7	3.0
October 1958	408	408	408	408	4.2	3.1	2.7	2.3
November 1958	367	368	368	367	4.2	3.8	1.1	2.5
December 1958	561	561	561	561	4.9	2.4	0.0	0.7
January 1959	546	561	561	532	3.5	3.2	0.4	1.1
February 1959	614	618	618	600	3.7	3.5	1.0	1.0
March 1959	302	304	303	300	3.1	2.3	2.4	—0.2
April 1959	767	779	779	761	3.3	2.4	2.8	0.6
May 1959	635	642	642	626	1.0	0.9	4.7	1.3
June 1959	402	409	409	399	0.6	0.4	4.3	2.0

TABLE VI

Mean and median hearing levels (HL), in db re audiometric zero, and standard deviations for children in otologically normal and abnormal populations tested between June 1958 and June 1959.

FREQUENCY (CPS)	NUMBER TESTED		MEAN HL		MEDIAN HL		SD	
	NORM	ABNORM	NORM	ABNORM	NORM	ABNORM	NORM	ABNORM
Right Ear								
250	2029	412	— 9.8	—5.2	—10.6	—6.9	7.7	12.2
500	2175	457	— 7.2	—2.2	— 7.4	—4.5	7.6	12.3
1000	2175	457	— 5.3	—0.3	— 5.8	—2.7	7.6	12.7
2000	2174	456	— 4.4	—0.1	— 4.7	—2.9	8.0	13.0
4000	2026	411	— 3.6	+2.3	— 4.1	—1.4	9.2	15.2
6000	2040	420	— 1.8	+4.4	— 3.0	+0.7	10.1	15.5
8000	2017	407	— 3.0	+3.4	— 3.9	0.0	11.0	17.8
Left Ear								
250	2029	413	—10.6	—6.8	—11.1	—8.9	7.1	10.7
500	2175	457	— 7.4	—3.0	— 7.8	—4.8	7.3	11.4
1000	2175	457	— 5.2	—0.2	— 5.6	—2.8	7.4	12.7
2000	2175	456	— 4.5	—0.7	— 4.8	—2.8	8.2	12.6
4000	2026	410	— 3.1	+1.2	— 3.7	—2.2	9.1	12.0
6000	2040	419	— 1.4	+3.7	— 2.4	+0.7	10.3	15.7
8000	2018	406	— 3.0	+3.0	— 3.8	—0.5	11.1	16.7

0.7 to 4.5 db. The differences, therefore, vary in magnitude from audiometer to audiometer. It is also seen that there is an additional variation between right and left ears by audiometer and by frequency.

In tables IV and V, it can be seen that the differences between corrected and uncorrected mean hearing levels vary from month to month. For example, the differences in hearing levels in the right ear range at 250 cps from +1.1 to +4.8 db; at 1,000 cps from +0.8 to +3.7 db; at 4,000 cps from +0.2 to +4.9 db, and at 8,000 cps from —0.8 to +5.9 db. Table V shows similar ranges of differences for the left ear and again there is seen a variation between right and left ears.

For research purposes it was important to adjust the hearing level determinations in this study, despite the relatively small differences in some instances. When attempting to obtain normative data a shift of a few decibels will change a child from one category of hearing to another at certain hearing levels, and when such a shift is applied generally it will affect thousands of children.

DISCUSSION

As has been stated earlier, it was felt that hearing levels in children are substantially better than adult norms, and to measure them accurately it is necessary to have both the proper acoustic environment and audiometers which will test with linearity to 30 db below the American Standard audiometric zero. To demonstrate that this is so and that children in this study had hearing levels measured well below audiometric zero without masking, the findings on hearing levels determined between June 1, 1958, and June 30, 1959, are summarized in the following paragraphs. The detailed findings are being published elsewhere.[3]

During the above mentioned period, 2,175 children, evenly distributed between 5 and 14 years of age, had no otological abnormalities on physical examination. Those children with demonstrable otological abnormalities numbered 457.

The mean and median hearing levels, and the standard deviations for the two groups of children, are shown in table VI. Both the means and medians of the otologically abnormal group are higher, or less sensitive, than those for the normal children. It is to be noted that these measures of central tendency in both groups of children are significantly lower than the audiometric zero in current use.

Figures 3 and 4* are presented to show the percentage distribution of hearing levels by ear and frequency for the otologically normal and the otologically abnormal groups of children. Of the otologically normal group, 92 per cent had hearing levels lower or more sensitive than the American Standard audiometric zero at 250 cps. This percentage falls progressively as frequencies increase, until at 8,000 cps 65 per cent of the children without abnormalities have hearing levels below audiometric zero. Of 457 children with demonstrable otological abnormalities, 80 per cent have hearing levels below audiometric zero at 250 cps. This percentage also falls as frequencies increase, to 50 per cent at 8,000 cps. These data indicate the high percentages of children with otological abnormalities as well as those without

*Figures 3 and 4 appear as Figures 2 and 3 in Part I, pp. 275 and 276.

these defects who have hearing levels substantially better than audiometric zero. A study of the distribution in figure 3 indicates no evidence of masking.

There can be no question as to whether or not audiometers need to be properly maintained within the American Standard Specification if hearing measurement with these instruments is to be done with accuracy. This study demonstrated that at least one commercially available audiometer can be made to meet the American Standard Specification and that it can be modified to test with linearity below audiometric zero, but to accomplish this, proper calibration and repair facilities are needed.

Information obtained from reputable acoustics laboratories in the United States indicates that the experience with audiometers and audiometer performance in this study is not unique to the make of audiometer used. Recent studies[4,5] on the output and general condition of audiometers in use in clinical situations in Scotland provide further evidence of the instability of these instruments and the need for better construction, better maintenance, and more frequent calibration.

A distinction should be made between the steps taken for the research purposes of this study, such as the adjustment of hearing level determination readings, and the necessary precautions taken in regard to maintenance of acoustic environment and audiometer calibration. These latter must be made an integral part of any hearing measurement program whether of a school population, a clinical case load, or an industrial program.

SUMMARY

Preliminary to a long-term, nationwide study of children's hearing problems, an experiment was conducted in acoustic environment control and audiometer modification and performance. It is concluded that rigid criteria for control of acoustic environment can be met in the field; that audiometers can be modified to test accurately levels well below the American Standard audiometric zero; that precautions taken to control acoustic environment and to check audiometer calibration before and during use should be an integral part of any measurement hearing program.

Mean and median values of hearing levels of children in this study vary with frequency and are more sensitive than the American Standard audiometric zero. A substantial number of otoscopically abnormal ears do not show hearing loss and conversely many ears with hearing loss show no observable otologic abnormality. It is concluded that audiometric testing alone cannot identify physical abnormalities of the ear which may have predictive value.

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THE PROTECTIVE VALUE OF THE STAPEDIUS REFLEX: AN EXPERIMENTAL STUDY

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BY INVITATION

THE purpose of this paper is to present further evidence on the protective function of the stapedius reflex, particularly as related to the phenomenon of protection afforded by a short pure-tone immediately preceding a loud impulse-type noise.

The role of the middle ear reflex in providing protection against loud noises has been debated for at least three hundred years, but little experimental evidence had been presented until Kato[5] published an extensive study in 1913. His results indicated that ears were more easily damaged by loud noise if they had been deprived of the middle ear reflex. He exposed rabbits to the sound of a Galton pipe and observed the contralateral contraction of the middle ear muscles. After a given exposure the reflex would no longer respond to the noise, indicating a diminution in the sensitivity of the ear.

Denervation of the stapedius by extraction of the facial nerve, cutting the motor trigeminus (masticator) and thereby paralyzing the tensor tympani, or anesthetizing the animal, made the ear more easily damaged by the noise.

In 1954, Taruya[8] used anatomical changes to evaluate the damage produced by the noise of "cracker-ball" explosions. More destruction was seen in sections of the cochleas of animals deprived of the stapedius or tensor tympani reflex than in those in which the reflex functioned.

Galambos and Rupert[3] utilized the measurements of cochlear potentials in unanesthetized cats to show that severance of the muscle tendons resulted in increased sensitivity to acoustic trauma.

Fletcher and Riopelle[2] showed that a short pure tone preceding each of a series of gun shots would provide protection against acoustic trauma. They measured the temporary threshold shift in human volunteers occurring after exposure to one hundred rounds of blank 30-caliber machine-gun fire.

Recently, the author published a preliminary report[4] which presented results from exploratory animal experiments designed to test the value of the "protective tone." The data showed that noise sufficient to produce permanent diminution of cochlear potential response in cats with electrodes implanted in the round window, produced little or no change in the animals given the benefit of the "protective tone." It appeared that this protection was due to the stapedius reflex. Because the number of animals used was small, further work was deemed necessary. The present paper is a report on the completed series.

Work prepared while assigned to the Ireland Army Hospital, Fort Knox, Kentucky, section of Otolaryngology. Presently at the Department of Otolaryngology, Karolinska Institute, Stockholm. Supported through a special fellowship grant from the National Institute of Neurological Diseases and Blindness.

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MATERIAL AND METHODS

The procedure used in the experiments was essentially the same as was discussed in the preliminary report. The ears of seventy-nine cats were implanted with round window electrodes according to the method used by Galambos and Rupert.[3] A ball-tipped, enamel-coated no. 36 stainless steel electrode inside a small polyethylene tube was laced to the bulla, and the tip was placed in contact with the round window. At the time of implantation, the stapedius tendon was cut, the tensor tympani was separated from its attachment to the malleus, or the stapedius was denervated by extraction of the facial nerve. Inactivation of the reflex was carried out in one ear of each animal.

The auditory acuity was estimated by measurement of the cochlear potential sensitivity after the animals had recovered from the surgical experience. Pure tones were presented by means of an overhead speaker and the round window potentials were picked up by the implanted electrodes, amplified and observed on an oscilloscope. The sound pressure required to produce a response of 10 microvolts was recorded similar to the method reported by Wever and Smith.[11]

Comparison of the average cochlear potential response at 500, 1000, 2000 and 4000 cycles per second (cps) before and after exposure gave a measure of the amount of damage produced.

The animals were exposed to the sound of gunfire in a wire cage suspended over the muzzle of a machine gun. Two-thousand rounds were fired with an interval of two to six seconds between shots. A delay circuit made it possible to precede each round with a tone of 100 decibels (db) at 1000 cps for 200 milliseconds before the gun was fired.

The sensitivity of the cochlear potential response was recorded as soon as possible after exposure and at frequent intervals over the subsequent twenty days. The animals were then sacrificed and their ears perfused. A note was made of the gross appearance of the bullae. Histologic sections of the ears were made after decalcification and imbedment in celloidin.

RESULTS

Data from 57 ears are included. The preliminary report[4] was based on the first ten animals of the series.

Nineteen ears with intact middle ear tendons were exposed to the sound of 2000 rounds of 30-caliber gunfire. The immediate mean loss was 26.5 db. There was little or no tendency towards recovery.

Fifteen ears in which the middle ear was intact were exposed to the same amount of noise in the same way except that each round was preceded by the pure tone. The average immediate loss was 2.7 db with little change during the following twenty days.

These results were submitted to the "t" test, and the analysis revealed that the difference was significant at better than the 0.1 per cent level.

Six ears in which the tensor tympani tendons had been cut were exposed to the noise with the "protective tone." The average immediate loss was 0.67 db.

Five ears with severed stapedius tendons were exposed to the noise preceded by the pure tone. The average immediate loss was 14 db. After three days, the mean loss was 22.5 db.

The difference between the loss in the ears with cut stapedius tendons and that in the ears with intact tendons following exposure with the "protective tone"

was tested statistically and found to be significant at better than the 0.1 per cent level.

Denervation of the stapedius was performed in a number of animals. After exposure with the "protective tone," the immediate loss was 24 db.

Twenty days following exposure the animals were again anesthetized and their ears perfused with saline solution and fixative. The bullae were opened and the gross appearance noted. Most of the ears showed very little reaction to the implanted electrodes. In a number of animals, however, the middle ear was

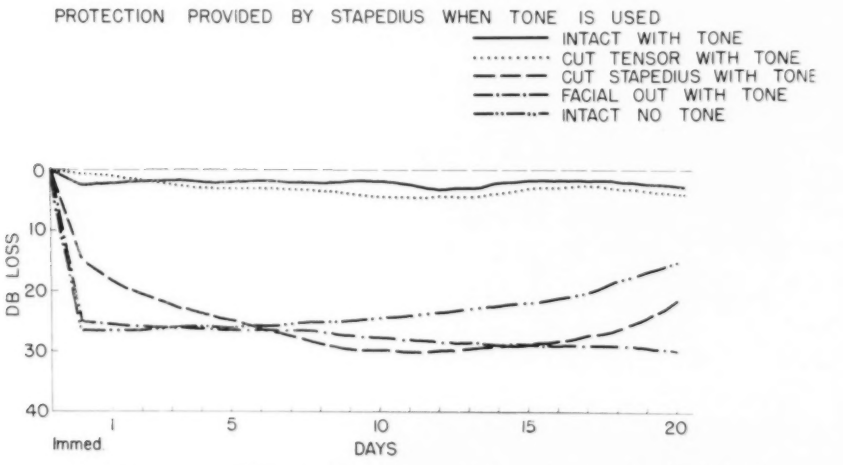

FIG. 1—Each line represents the averaged cochlear potential change in a number of animals. The pre-exposure level is represented by the zero line. Responses are shown immediately following exposure to noise and for 20 days subsequently. Normal ears with intact middle ear muscles exposed and with no protection showed a marked loss as compared to those intact ears exposed, but with a short pure tone preceding each round. Inactivation of the stapedius by removing the facial nerve or by severing its tendon led to an equally marked loss. Detachment of the tensor tympani made little difference.

Figure 1 is a graph of these results. The ears with intact tendons or with a cut tensor tympani exposed with the "protective tone" show no significant loss. Intact ears exposed without the tone, or ears deprived of the stapedius reflex show a marked loss.

Of the ears deprived of the reflex exposed without the tone, two ears with severed tensor tympani lost 28 db, three ears with extracted facial nerves averaged 24 db, and four ears with cut stapedius tendons averaged 34 db loss immediately following exposure (fig. 2). filled with pus. The results from these infected animals were not included in this report. Generally they had poor cochlear potential responses prior to exposure and little change after the firing.

Nine representative ears were sectioned after decalcification and imbedment in celloidin. The sections show very little reaction in the middle ear (fig. 3). The tubes which remained when the electrode was removed show clearly. They seem to consist of two layers of low cuboidal epithelium.

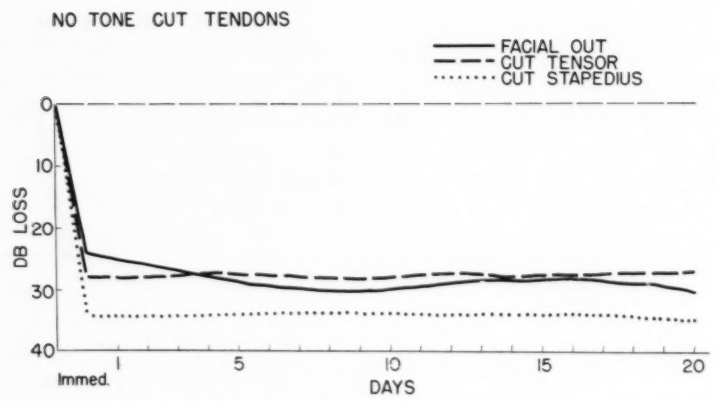

FIG. 2—The changes which occurred in the ears without intact middle ear muscles when they were exposed without the "protective tone."

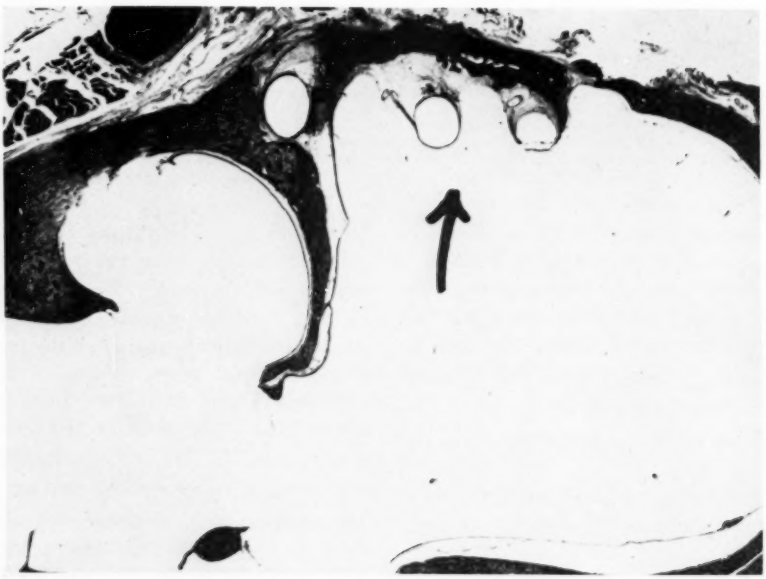

FIG. 3—A section through the bulla in the area through which the electrode had been laced. The epithelial tube which had formed over the electrode is shown.

FIG. 4—Section of the tensor tympani showing its attachment to the malleus.

Figure 4 shows an intact tensor tympani muscle. Figure 5 is a section through a divided tensor tympani muscle. Figure 6 shows an intact stapedius tendon. (None of the sections happened to show the entire length of the tendon.) Figure 7 is a section of the thin fibrous band which had formed following severance of the stapedius tendon. It reaches from the head of the stapes to the promontory. Theoretically cutting the stapedius tendon would reduce the stability of the ossicular chain. For this reason, as well as to avoid adhesive band formation, the stapedius was denervated in some animals by extraction of the facial nerve.

Some damage to the organ of Corti was seen in the three ears that were sectioned that had been exposed with the benefit of the "protective tone." Figure 8 shows a section of a relatively intact area from one of these animals.

Figure 9 is a section from the second turn of the cochlea of a cat exposed without the tone. The organ of Corti has been completely destroyed. The nerve cells of the spiral ganglion in this area show degeneration. Less marked damage was seen scattered throughout the cochleas of the other ears exposed without protection.

DISCUSSION

These experiments were planned with the hope of providing optimum conditions for observation of the protective function of the middle ear reflex.

The attenuation which can be produced by a contraction of the muscles, and thus theoretically, the potential for protection, has been measured by others. Wiggers[13] measured the change in cochlear potential response produced by spasmodic contractions of the middle ear

FIG. 5—Tensor tympani after the tendon had been severed.

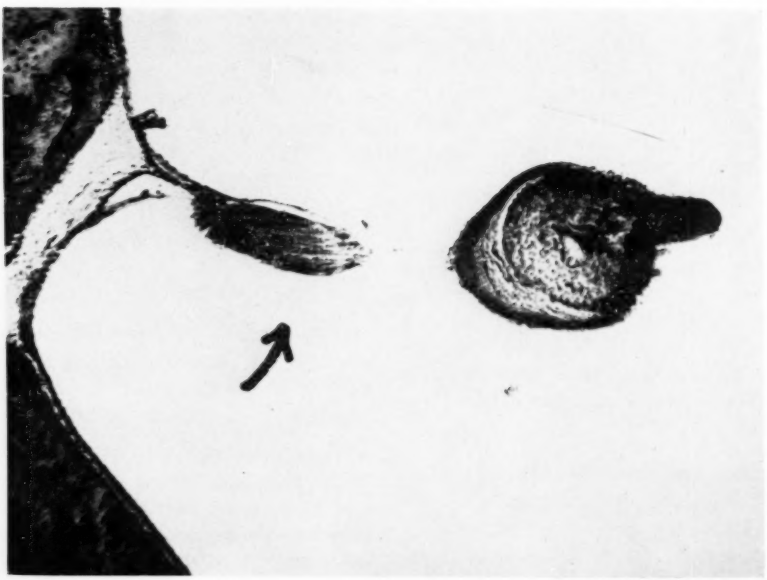

FIG. 6—Normal stapedius tendon. (The orientation of the specimen prevented demonstration of the entire length of the tendon.)

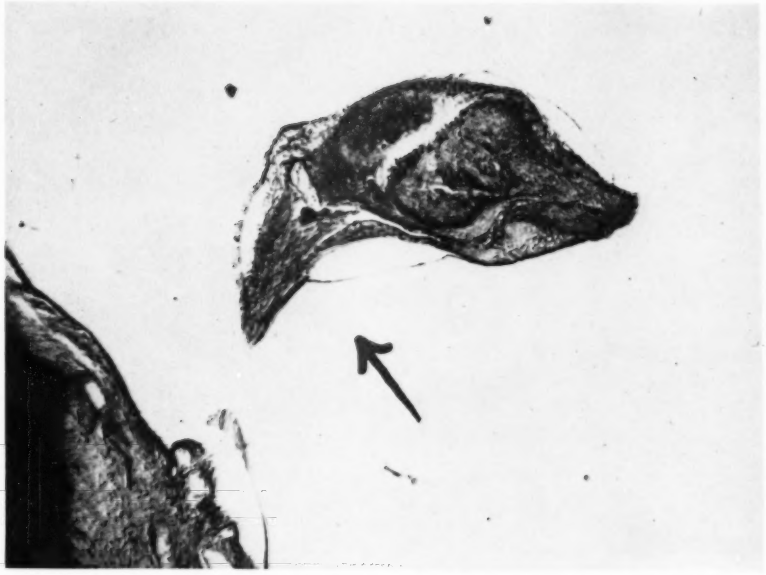

FIG. 7—Fibrous band which formed after severance of the stapedius tendon.

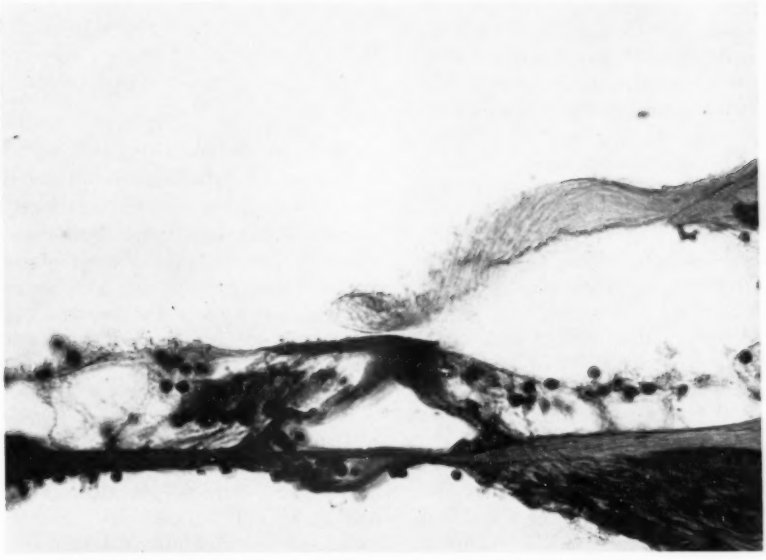

FIG. 8—Organ of Corti from a cat which had had the benefit of the "protective tone."

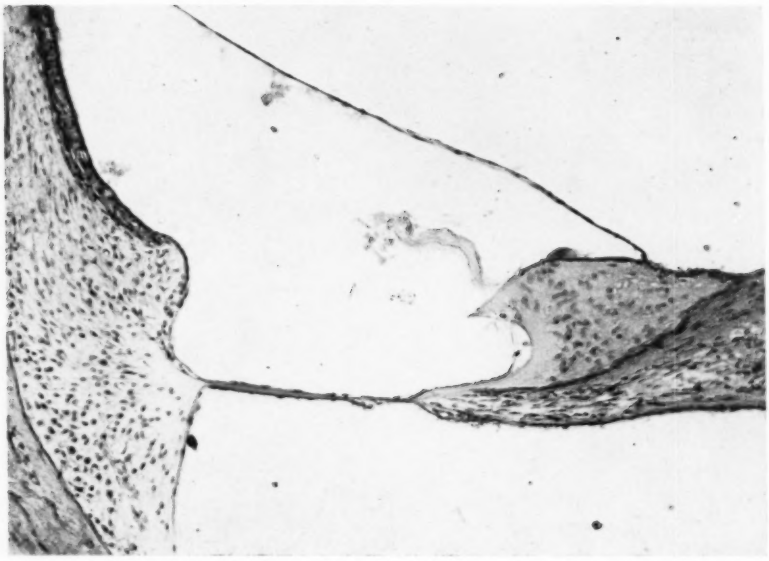

FIG. 9—Section from the cochlea of an animal exposed without protection to the noise of 2000 rounds of 30-caliber machine-gun fire.

muscles induced by light general anesthesia. He observed attenuation up to 45 db. Attenuation up to 20 db. of the cochlear potential response was reported by Wever and Vernon[12] with contralateral sound stimulation. Using implanted round window electrodes in anesthetized cats, Galambos and Rupert[3] obtained similar values.

In evaluation of the experiments reported dealing with the damage to the inner ear with and without the protection of the muscles, the influence of the latency and fatigability of the reflex must be considered. The latent time is about 10 milliseconds, and maximum contraction does not occur until after 63 milliseconds for the stapedius and 132 milliseconds for the tensor tympani when they are stimulated by a tone of 135 db, according to the recent experiments on rabbits reported by Wersäll.[10]

Thus the blast-type noise used by Taruya[8,9] would be expected to reach the inner ear without significant attenuation from a contraction of the middle ear muscles.

With continuous stimulation, the reflex becomes fatigued. In 30 seconds, the tension of the muscles is reduced by about 50 per cent[10] and continues to diminish further with continuing stimulation. Thus, experiments utilizing prolonged noise expose the inner ear with constantly decreasing acoustic reflex protection. In their report, Galambos and Rupert[3] mention this difficulty. Their animals were exposed to noise for a period of three minutes and the ears with severed tendons showed more evidence of acoustic trauma than the normal ears. They stated that the effect could not be definitely attributed to the lack of active contraction, since an al-

ternative explanation might be that the ossicular chain lacked support after it was deprived of the middle ear muscles.

Kato[5] in his early experiments with rabbits overcame these problems. He used a noise stimulation for 30-second periods, testing the auditory acuity between exposures. Normally, a total of six to seven minutes of stimulation was required to reduce the sensitivity of the ear, but if the tensor tympani or stapedius was paralyzed, the responsiveness was lost after thirty to ninety seconds. Therefore, the damaging noise was presented for the period of time during which the muscles could remain effective. When the muscle function was destroyed, it was done by denervation or narcosis and not by disrupting the middle ear tendons. His data, therefore, clearly demonstrate the ability of the acoustic reflex to provide protection.

The experiments of Fletcher and Riopelle[2] established the protective value of a short pure tone preceding a loud impulse-type noise. By inference, their results indicate activity of the middle ear muscles. However, since in human subjects they were unable to interfere with the activity of the stapedius or tensor tympani, the data do not prove that either is actually the mediator of the protective effect. For this purpose, animal experiments are required. The experiments reported here extend the work of Fletcher and Riopelle by testing the effect of their "protective tone" on animals with and without intact middle ear reflexes. Round window potentials were used as a measure of acoustic trauma. Authorities[1,7] may differ about the value of this method for accurate estimation of hearing; however, alteration of the cochlear potentials of the degree produced by the noise exposure used in this experiment undoubtedly reflects damage to the auditory mechanism.

The data provide further evidence on the protective value of a short tone preceding a loud blast. The noise exposure was more severe than that used by Fletcher and Riopelle, and in unprotected animals the sensitivity of the inner ear was depressed for the entire twenty-day period of the experiment. Therefore, the data show that this type of protection is effective against enough trauma to produce severe damage in unprotected ears.

The results show that the tone failed to provide any protection if the stapedius was inactivated. Thus, more data is provided on the ability of the stapedius reflex to provide protection against acoustic trauma.

The function of the tensor tympani was not made any more clear by the data obtained in this study. Although Kato[5] was able to show that denervation of the tensor tympani made the ear more susceptible to loud noise, the effect was not as marked as that obtained by denervation of the stapedius. Others[6,10] have discussed the relative inactivity of the tensor tympani. It was not possible to show any decrease in effectiveness of the "acoustic-reflex eliciting" tone following severance of the tensor tympani.

SUMMARY AND CONCLUSIONS

Cats with electrodes implanted in the round window for recording of their cochlear potentials were used to measure the effectiveness of the middle ear muscle reflex in preventing acoustic trauma. Two-thousand rounds fired from a 30-caliber machine gun at intervals of two to six seconds were used as the noise exposure. In some instances, each round was preceded by a short pure tone designed to activate the middle ear muscle reflex. In one ear of each of the animals, the tension of the stapedius was severed, the stapedius was denervated, or the tensor tympani was separated

from its attachment on the malleus. Histologic studies were performed on a few representative animals.

The data show that a tone of 1000 cps at 100 db preceding each round for 200 milliseconds significantly reduced the damage to the inner ear if the middle ear muscles were intact.

If the stapedius tendon was severed, or if the muscle was denervated, no protection was afforded by the tone.

Detachment of the tensor tympani did not seem to influence the protective effect of the tone.

Anatomical study showed that there was little reaction to the electrodes and the middle ear in most animals remained in good condition. The animals with evidence of infection were excluded from the series. Sections of the cochlea showed some spotty damage to all the ears. There was more obvious destruction in the cochleas exposed without protection.

Under the conditions of this experiment, the stapedius muscle reflex provided significant protection to the inner ear against the harmful effect of loud noise. The data further demonstrate the protective value of a short pure tone preceding loud impulse-type noise.

Acknowledgments:

The author is indebted to the United States Army Medical Research Laboratory, its commanding officer, H. Glascock, Col., M.C., and the director of its psychology division, E. K. Montague, Lt. Col., M.S.C., for providing the facilities and supplies for this investigation. The kind and generous assistance of Drs. J. Fletcher, F. Guedry, and G. Crampton was invaluable.

The temporal bone sections were made by Dr. Merle Lawrence and his laboratory under contract DA-49-007-MD-634. The graphs were prepared by the photography laboratory of the Army Medical Research Laboratory. Microphotographs were made at the Histology Department of the Karolinska Institute, Stockholm, with the generous assistance of Dr. Jan Wersäll.

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DISCUSSION

SCOTT N. REGER, PH.D., Iowa City: Perusal of the recent literature reveals the publication of an ever-increasing number of articles devoted to the intratympanic muscles of animals and of man. It is obvious that these studies have been stimulated and accelerated by a growing concern over the injurious effects of high intensity level environmental noise on the sensitivity of the ear, since the middle ear muscles are known to contract reflexly when the ear is exposed to high sound pressure levels.

Dr. Hilding's paper is an exceedingly significant contribution to a more complete understanding of the protective nature of the acoustic reflex in both animals and man. His paper is a follow-up of a companion study by Fletcher and Riopelle on humans at the laboratory with which Dr. Hilding formerly was associated. The results of the two studies mutually support and reinforce each other.

One of the most interesting results of the animal study is the apparent insignificance of the tensor tympani in the acoustic reflex complex. It may be noteworthy that voluntary contraction of the middle ear muscles in man involves the tensor tympani to a significant degree. It has been observed in our laboratory that if individuals so gifted are exposed to low frequency sounds at maximum intensity tolerable levels while relaxed, the loudness of the sound is markedly decreased whenever and as long as the middle ear muscles are contracted voluntarily.

It is anticipated that this excellent paper will stimulate additional study of the physiology and utility of the middle ear muscles.

DURATION OF OCULOMOTOR AKINESIA OF INJECTABLE ANESTHETICS

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and

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THE purpose of this study was to establish the duration of motor paralysis produced by the common local anesthetic agents and by one new agent, when used in ophthalmic surgery for retrobulbar block.

Retrobulbar anesthesia combined with orbicularis muscle block is unquestionably the commonest mode of anesthesia used for intraocular surgery in this country. Retrobulbar block was first described by Pooley[5] in 1914. Since that time many workers have contributed to the refinements of local anesthesia in ophthalmic surgery. Gifford[3] has clearly defined the importance of positive vitreous pressure when performing ocular surgery under local anesthesia. Snydacker, Deutsch and Bayard[7] presented one of the early comparative studies of various blocking agents and evaluated the effect of epinephrine and hyaluronidase as an adjunct to these anesthetics. Atkinson's comprehensive monograph[1] covers the field of local anesthesia in ophthalmology in detail, and to him must be given the credit for emphasizing the importance of digital pressure as an adjunct in ocular anesthesia.

Kirsch and Steinman[4] carefully analyzed the technique of reduction of ocular pressure by digital pressure and clearly defined the procedure. Everett, Vey and Veenis[2] compared the decrease in ocular pressure under local and general anesthesia and studied the relationship of motility to ocular pressure after retrobulbar injection. Scheie[6] described prolongation of local anesthesia by orbital catheterization with a polyethylene tube for continuous anesthesia.

At this time there is general agreement that a properly placed retrobulbar injection of one and one-half cubic centimeters to two cubic centimeters of one of the common injectable anesthetic agents followed by four to five minutes of firm digital pressure, in conjunction with a suitable orbicularis muscle block in a well sedated patient, will usually provide adequate anesthesia and akinesia for most intraocular surgical procedures.

Discussions with, and the study of publications of, ophthalmic surgeons reveal decided preferences in anesthetic agents, depending upon the surgeon's pharmacologic knowledge, clinical experience or operating room routines. Many surgeons prefer combining hyaluronidase and/or epinephrine with the anesthetic of their choice.

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The perfect local anesthetic agent has yet to be found. Essentially maximum depth and duration of anesthesia and akinesia are desired without systemic or local tissue toxicity. These characteristics may be evaluated in many ways. The intradermal wheal is utilized in man and animals to determine the duration of suppression of pain sensation. Often the duration of anesthesia is determined by caudal block of rat tail, noting the return of sensation to a painful stimulus. In the ophthalmic literature the evaluation of retrobulbar block is usually measured by corneal sensation or the pupillary reflex. We believe these latter two tests used in ophthalmology are unreliable and fail to determine the important factor of extraocular motor function which is so closely related to positive vitreous pressure.

FIG. 1—Nasal route for administration of retrobulbar anesthesia in orbit of monkey.

FIG. 2—Inferior-temporal route for retrobulbar anesthesia as employed in humans is not satisfactory in monkey because of hollowing of the monkey orbit in this region. (Note shadow of needle.)

This study presents a new technique devised by one of us for the evaluation of oculomotor function after retrobulbar block, utilizing the phenomenon of optokinetic nystagmus in Rhesus monkeys.

MATERIALS AND METHODS

Rhesus monkeys were used in this study because the tests employed require macular function, which is not present in most lower forms of laboratory animals. With the monkey restrained on a table, three fourths of a cubic centimeter of anesthetic agent was injected into the right orbit in the apex of the muscle cone by a nasal route with a 24-gauge one and one-quarter inch needle. The nasal route provides a more satisfactory retrobulbar

anesthesia in monkeys (fig. 1) than the usual inferior-temporal route used in humans. The inferior temporal bony orbit of the monkey is more hollowed and more completely filled by the globe than in man (fig. 2), preventing a direct needle route to the retrobulbar space.

The effectiveness of the motor akinesia was determined by placing the table on which the monkey was restrained within a revolving drum (fig. 3). Alternate observers. Table I is a typical work sheet used in one series. Grading of the optokinetic nystagmus was from zero, for complete abolition of motion, and in steps of one to plus four—four representing complete return of motor function and the end of the test. The pupil size of each eye and the amount of residual blepharoptosis of the injected eye were noted at the completion of the test. If satisfactory abolition of nystagmus was not achieved within five minutes after the retrobulbar injection, the animal was discarded and another animal injected in its place. Each drug or combination of drugs was tested in a group of ten monkeys, each with adequate retrobulbar block as described above.

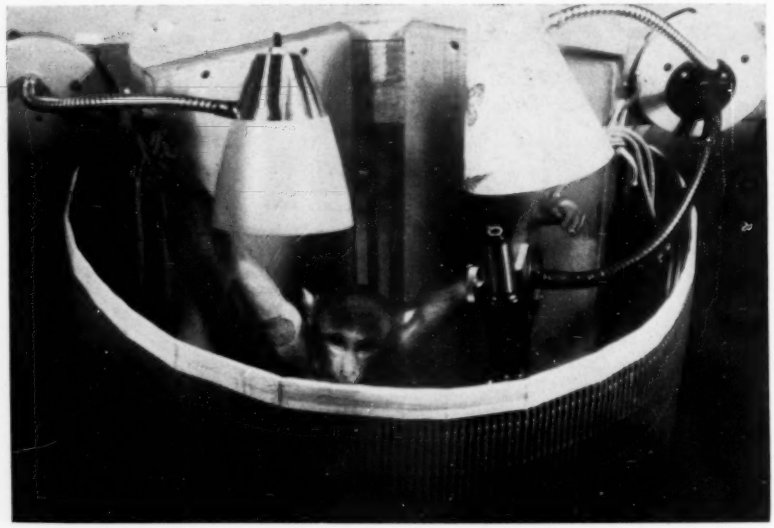

FIG. 3—Optokinetic nystagmus drum, which is motor driven, is large enough to accommodate restrained monkey.

black and white stripes line the inner surface of the drum and produce optokinetic nystagmus in the monkey. If the right eye was properly injected, nystagmus occurred in the left eye only. Observations of the nystagmus were made every five minutes, and the procedure terminated upon the return of nystagmus to the injected eye, as determined by two

The following drugs or combination of drugs were studied:

DRUG Procaine 2%
AMOUNT 0.75cc
HANDLER Don Sheffy
TIME 3:30 - 7:00 PM
DATE 2-4-60

Animal	OPK 5min		Optokinetic response of injected eye OD after																		%*	Pup. size mm	
	OD	OS	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90		OD	OS
1	+2		+1	+1	+1	+1	+1	+2	+2	+3	+4								75	5	2
2	+2		+2	+2	+2	+3	+3												50	5	3
3	+2		+2'	+3	+4														10	5	2
4	+2		+1	+1	+1	+2	+3	+3'	+4										10	5	3
5	+1		+2	+2	+2	+3	+3	+4											95	5	3
6	+2		+3	+2	+2	+2	+4												30	5	3
7	+1		+2	+2	+2	+3	+2	+2'	+2	+2	+3	+4							10	5	3
8	+2		+2	+2	+3	+3	+4												40	5	3
9	+2		+2	+4															65	4	3
10	0-1		+2	+2	+2	+2	+4												20	5	2

* Residual Lid %

FIG. 4—Typical worksheet showing the results of ten retrobulbar blocks with 2 per cent procaine.

Procaine

1 per cent; 2 per cent; 2 per cent with seven units of hyaluronidase per cubic centimeter; 2 per cent with epinephrine 1:100,000; 2 per cent with seven units of hyaluronidase per cubic centimeter and epinephrine 1:100,000; 4 per cent.

Monocaine

1.5 per cent

Xylocaine

2 per cent

Tetracaine

0.1 per cent

Carbocaine

2.0 per cent; 2 per cent with seven units of hyaluronidase per cubic centimeter; 2 per cent with epinephrine 1:100,000; 2 per cent with seven units hyaluronidase per cubic centimeter and epinephrine 1:100,000.

RESULTS

The duration of akinesia of the various anesthetic agents tested is shown in figure 5. The shortest duration was obtained by 1 per cent procaine solution; the longest duration was achieved with 2 per cent mepivacaine (Carbocaine). The difference in duration of akinesia between tetracaine and Carbocaine is not significant; however, the authors concurred that tetracaine appeared to be the only tissue-irritating drug of those studied. No significant prolongation of akinesia was noted after increasing the strength of procaine from 2 per cent to 4 per cent.

The findings of many authors regarding the use of hyaluronidase, epinephrine, and their combinations with procaine have been confirmed (fig. 6).

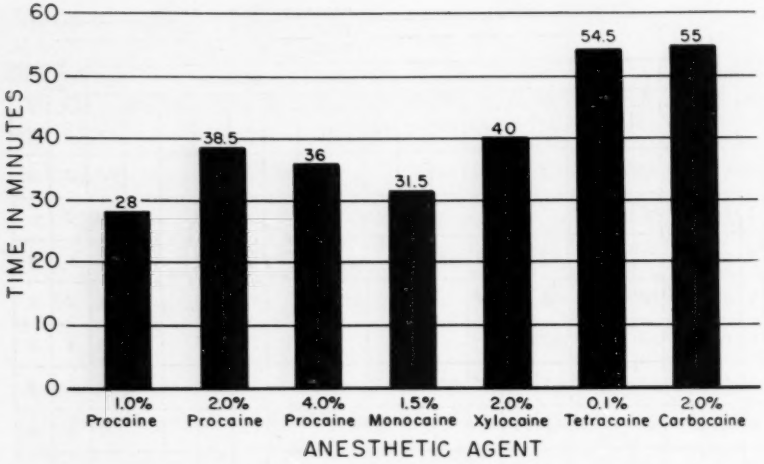

FIG. 5—Duration of akinesia of various anesthetics produced by retrobulbar injection in monkey.

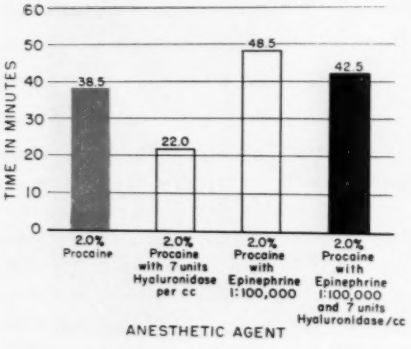

FIG. 6—The duration of akinesia produced by 2 per cent procaine alone; with hyaluronidase; with epinephrine; and with their combination is shown.

Hyaluronidase greatly aids rapid onset but significantly reduces the duration of anesthesia. Epinephrine significantly enhances the duration. The combination of epinephrine and hyaluronidase enhances the duration of akinesia less than epinephrine alone, but does increase the speed of onset.

Somewhat different results were obtained when similar combinations of hyaluronidase and epinephrine were tested with mepivacaine (fig. 7). Hyaluronidase markedly decreased the duration of anesthesia; however, epinephrine caused little change in duration. Consequently the combination of epinephrine

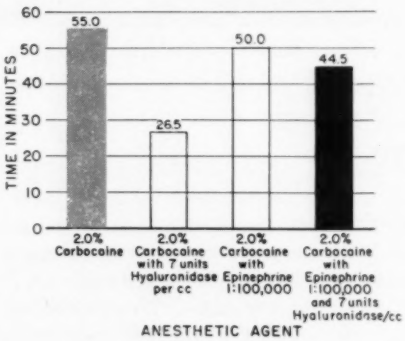

FIG. 7—The effect of epinephrine, of hyaluronidase, and of their combination on Carbocaine.

and hyaluronidase tends to accentuate the role of hyaluronidase, giving a significant over-all decrease in duration of akinesia.

DISCUSSION

The results presented do not reveal the rapidity of onset of anesthesia produced by the various agents. In the process of conducting the tests, the number of rejected animals in each series gives some idea of the rapidity of onset of action of each drug studied, as the test for abolition of nystagmus was determined five minutes after injection. In using 1 and 2 per cent procaine with no additives, as many as eighteen animals were injected to obtain ten satisfactory blocks. The longer-acting drugs required no more than eleven or twelve animals. Hyaluronidase enhanced the onset of procaine so that only twelve injections were required to obtain ten satisfactory blocks.

The failure of epinephrine to enhance the duration of mepivacaine may be explained on the basis of a vasoconstrictor property of mepivacaine which has been ascribed to the drug. Consequently further vasoconstrictor effect is not obtained.

Statistics compiled at the completion of this study revealed no correlation between duration of anesthetic effect and pupil size or degree of ptosis. The authors felt these measurements were of no help in evaluating these agents.

CONCLUSIONS

This study revealed that mepivacaine and tetracaine give the longest duration of akinesia; however, tetracaine appeared to irritate the ocular tissues. The duration of akinesia obtained by procaine is enhanced by epinephrine and its onset is made much more rapid by hyaluronidase. The combination of epinephrine and hyaluronidase with procaine is indicated if hyaluronidase is used, for it greatly reduces duration of akinesia.

The effect of mepivacaine does not appear to be augmented by epinephrine or hyaluronidase, as shown by this study.

The utilization of optokinetic nystagmus in the monkey appears to be a satisfactory means of evaluating akinesia produced by retrobulbar anesthesia and more effective than pupil reaction or size.

The authors concluded that the new injectable agent, mepivacaine (Carbocaine), holds promise for use in ophthalmic surgery. Further studies with this drug are in progress.

SUMMARY

The duration of akinesia produced by retrobulbar injection of the common anesthetic agents was measured, using optokinetic nystagmus in the Rhesus monkey as a criterion.

The effects of hyaluronidase and/or epinephrine with procaine as noted in this study confirm observations by others.

A new agent, Carbocaine (brand of mepivacaine), was found to produce an excellent duration of akinesia with no tissue irritation when used for retrobulbar injection. Epinephrine and hyaluronidase did not appear to improve its effectiveness.

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DISCUSSION

DANIEL SNYDACKER, M.D., Chicago: I would like to congratulate Dr. Everett and his co-workers for designing such a neat experiment and presenting it so well. Their use of the monkey as an experimental animal and their interesting observations on optokinetic nystagmus have opened a number of avenues for fruitful discussion, but I would like to confine myself to certain points of clinical interest.

There are few ophthalmic surgeons at the present time who do not utilize a retrobulbar injection as part of their routine anesthesia for intraocular surgery; yet many surgeons do not realize exactly what such an injection accomplishes. As the present authors have pointed out so clearly, one of the effects is a temporary paralysis of one or more of the extraocular muscles. This effect has two important advantages: first, the patient is unable to move his eye wildly in the event that he might feel pain as the result of stimuli to the conjunctiva or lid margins; and second, some part of the hypotensive effect of a retrobulbar injection is thought to be secondary to the loss of tonus suffered by the extraocular muscles.

It is obvious that for these two factors to be really efficacious, the temporary paralysis must last long enough to allow even the slowest surgeon to finish a complicated case. Procaine can produce an adequate anesthesia, but epinephrine must be added to the solution so that its effect will not wear off too quickly as Deutsch, Bayard, and I showed in our experiment. (AMA Arch Ophthal, 51: 473-480, 1954) The present authors have corroborated this finding, since in their series, procaine without epinephrine was effective for only thirty-eight minutes, while the addition of epinephrine to the procaine prolonged the effect of akinesia to forty-eight minutes.

Addition of epinephrine may have a certain disadvantage, particularly in the presence of arterial hypertension. This disadvantage may be overcome by the use of mepivacaine. Mepivacaine (Carbocaine) is a new anesthetic agent which is an analogue of lidocaine (Xylocaine). It appears to be an effective agent, which when used in 1 or 2 per cent solution without the addition of epinephrine, lasts longer than procaine with epinephrine added. Mepivacaine is said to have twice the effectiveness of procaine of equal percentage and to be only slightly more toxic. Mepivacaine and lidocaine, by virtue of their molecular structure, are capable of spreading through the tissues without the addition of hyaluronidase. Everett, Vey and Finlay are the first to point out that the addition of hyaluronidase to mepivacaine actually shortens its anesthetic effect without increasing the effectiveness of its anesthetic properties. As we have seen, they also suggest that the addition of epinephrine shortens the period of akinesia of the extraocular muscles. This finding is at variance with that of Af Ekenstam and co-workers (Brit J Anaesth, 28: 503-506, 1956), Dhuner and his colleagues (Acta Chir Scand, 112:350-358, 1957), and Luduena and co-workers (Toxicol Appl Pharmacol, 2:295-315, 1960), who all found that epinephrine increases the length of action of mepivacaine. Even so, mepivacaine alone lasts longer than the combination of procaine plus epinephrine.

It is self-evident that the efficacy of any anesthetic agent depends on delivery to the right spot by the needle. It is sometimes difficult to inject a retrobulbar anesthetic exactly in this location. Every surgeon can cor-

roborate this by the fact that sometimes the patient is able to move his eye at a disconcerting moment or that the eye is not as soft as it should be. The fact that some experiments in the present report had to be excluded because optokinetic nystagmus was not abolished is experimental evidence of the importance of delivering the anesthetic solution to the exact place where it will paralyze the nerve to each muscle. If the anesthetic agent has a spreading factor, hyaluronidase, added, or if by virtue of its molecular structure, it disseminates widely through the tissues, more latitude in injecting the solution is allowable. As already pointed out, both lidocaine and mepivacaine disseminate through the tissues without the addition of a spreading agent. It is, therefore, a mistake to add hyaluronidase to either of these substances. Additional spreading of the solution is undoubtedly achieved by digital pressure, as advocated by Kirsch (AMA Arch Ophthal, 54: 697-703, 1955).

Mepivacaine appears to be a distinct addition to our anesthetic armamentarium. Its use is particularly suggested in those cases in which the cardiovascular status of the patient contraindicates the addition of epinephrine to the anesthetic solution.

DR. EVERETT: I would like to thank Dr. Snydacker for his instructive and generous remarks. We were aware of the difference of opinion regarding the effect of epinephrine on mepivacaine; however, it was necessary to report our findings as we saw them in this study. In applying our information here on a clinical level, I myself am not satisfied with this effect of epinephrine, and I might say we are in the process of looking into it further, to find out if indeed, it is a factor on a clinical basis.

WEGENER'S GRANULOMATOSIS

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WEGENER'S granulomatosis is a uniformly fatal syndrome which is identified pathologically by (1) necrotizing granulomatous lesions of the respiratory tract; (2) generalized necrotizing vasculitis; and (3) focal glomerulonephritis. Typically, the clinical diagnosis is established by the occurrence of intractable rhinosinusitis and nodular pulmonary lesions combined ultimately with the development of renal insufficiency. Following diagnosis, the average course is from two to six months, with three years being the longest reported survival. Uremia is the most common cause of death. Although the etiology remains unknown, it is considered to be a hypersensitivity reaction and thus is related to a wide variety of granulomatous and vascular diseases. Unfortunately, at this time there is no specific therapy, although adrenocortical steroids and antibiotics have been used with temporary benefit. Of great interest is the fact that ocular involvement has occurred in nearly 50 per cent of reported cases.[6] A few patients have developed proptosis with visual loss and exposure keratitis secondary to direct orbital spread from the nasal or sinus cavities. More patients, however, have some form of focal eye involvement, such as conjunctivitis, scleritis, uveitis, and limbal corneal infiltrates with ulceration. The limbal lesions resemble those which have occasionally been seen in cases of periarteritis nodosa.[1] The first pathologic study of the ocular manifestations in Wegener's granulomatosis has recently been reported.[3]

Primary and persistent eye symptoms have occurred in only one previous case[4] of 46 cases reviewed, and no isolated orbital granuloma has been verified. The following case presented both of these conditions.

CASE HISTORY

A 37-year-old white male mechanic had suffered persistent pain, redness and photophobia of the right eye since November 1957. Originally he was treated for an "eye cold," and in December of the same year received treatment for a "corneal ulcer." He was never asymptomatic, and in June 1958 a diagnosis of keratoconjunctivitis was made by another ophthalmologist. He was treated for a short period with oral and topical adrenocortical steroids, and showed some temporary improvement. However, by December 1958 the symptoms increased and he developed headaches on the right side and pain in the right orbit. At that time a diagnosis of sclerokeratitis was made and a course of systemic steroid therapy was given.

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The authors wish to express gratitude to Drs. G. W. Cleasby and R. J. Klienhenz of the Presbyterian Medical Center for the histologic studies used in this paper.

Presented as a *Clinicopathologic Case Report* at the Sixty-Fifth Annual Session of the American Academy of Ophthalmology and Otolaryngology, Oct. 9-14, 1960, Chicago.

First Hospital Admission

On June 5, 1959, the patient was admitted to the Presbyterian Medical Center, San Francisco, for a general medical evaluation. In addition to continued eye symptoms, the only positive history was that penicillin therapy had been given for a gonococcal infection in 1949. Other than the pathologic ocular findings, which were restricted to the right eye, the physical examination was negative. The left eye was normal in all respects, and remained so throughout the patient's illness.

Examination of the right eye revealed marked tenderness over a large area of nodular episcleritis superotemporally, along with generalized inflammation of the globe. Along the upper one half of the cornea there was a narrow band of superficial limbal ulceration and scattered infiltrates. A few fine keratic precipitates with 1 plus flare and cells were found. The fundus and intraocular pressure were normal.

Results of laboratory studies, including eye cultures, stool cultures, serologic test for syphilis, and skin tests, were normal. Blood studies were also normal except for minimal eosinophilia (maximum 7 per cent). Roentgenograms of the chest, skull, sinuses and orbit were normal. An upper gastrointestinal series was normal; barium enema revealed diverticulosis of the sigmoid colon, although this most likely did not explain several guaiac positive stools. A biopsy of the episcleral nodule revealed only chronic inflammation and degeneration.

Only moderate improvement resulted on treatment with analgesics, mydriatics, topical neomycin and dexamethasone solution, and systemic steroids (dexamethasone 0.75 mg. four times a day). A subconjunctival injection of prednisolone was also given. The patient was discharged three weeks after admission.

On each attempt to withdraw systemic steroids, the patient's symptoms increased markedly, and on July 9, 1959, severe uveitis with retinal detachment developed. Steroids were increased and chloramphenicol (1.0 gm. four times daily for seven days) was given without effect. A diffuse vitreous haze appeared, with rapid deterioration of vision to 20/200, and on August 11 a mass of increasing size appeared in the right orbit in the region of the lacrimal gland. Even with analgesics, orbital pain was extremely severe and the patient requested enucleation repeatedly.

Second Hospital Admission

On August 26, 1959, the patient was readmitted to the hospital. In the superior temporal orbit of the right eye, the firm bilobate mass had become more prominent, producing ptosis and decreased motility of the globe. A general physical examination revealed nothing remarkable except for a few small excoriations of the arms. Findings from blood studies, urinalysis, evaluation of serum electrolytes, and roentgenograms of the orbits and optic foramina were within normal limits. On August 28, enucleation and biopsy of the orbital mass were performed. Although more prominent in the area of the lacrimal gland, the mass extended posteriorly along the entire roof of the orbit. The patient was comfortable and the postoperative course was uneventful until five days later, when, while steroids were being tapered, severe abdominal and left shoulder pain developed. An electrocardiogram at this time was normal. Abdominal roentgenograms were normal; repeat chest roentgenograms revealed cardiac enlargement and densities in the apex and lower lobe of the left lung. Although there was no fever, a clinical diagnosis of myocarditis was made, and the impression after surgical consultation

was that the abdominal pain was referred from the chest. A repeat electrocardiogram on September 7 indicated diffuse myocarditis with left bundle branch block. The acute cardiac failure which ensued was treated intensively with antibiotics, steroids, vasopressors, and digitalis, all without effect, and the patient expired on September 8, the eleventh postoperative day.

OCULAR HISTOPATHOLOGY

The orbital biopsy specimen consisted primarily of lacrimal gland with some orbital tissue. Microscopic sections revealed marked infiltration with somewhat avascular granulomatous inflammation in which lymphocytes, plasma cells, epithelioid cells and immature fibroblasts predominated. Irregular areas of necrosis and numerous giant cells of the Langhans type were present (figs. 1 and 2). Several vessels showed marked thickening and eosinophilic staining of the walls (fig. 3). Gram, acid-fast and PAS stains provided no further information.

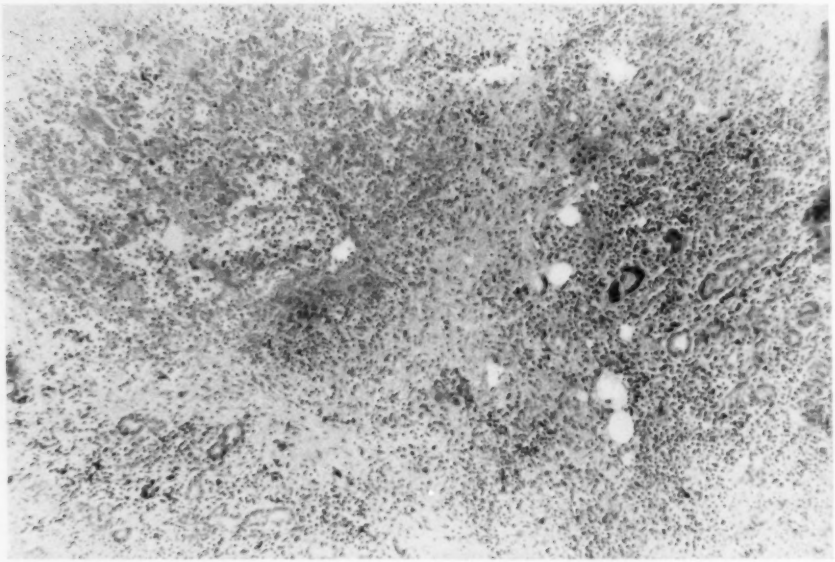

FIG. 1—Orbital biopsy. Section showing necrosis, fibrosis, and lacrimal tissue containing lymphocytes, plasma cells, epithelioid cells and Langhans' giant cells (H & E; × 220).

AUTOPSY

At autopsy the diagnosis of Wegener's granulomatosis was confirmed with the findings of widespread necrotizing arteritis, glomerulonephritis, pancarditis, and granulomatous tumors involving both lung apices. Focal necrotizing arteritis involved the heart, lungs, liver, kidneys, spleen and adrenal glands. No central nervous system, intestinal, or skin lesions were found. Acid fast and mycotic studies were negative.

The most striking feature seen in the sections of the globe was the tremendous thickening on the involved side (up to six times the normal thickness) (fig. 4). A pannus was present at the superior limbus, and the subjacent cornea con-

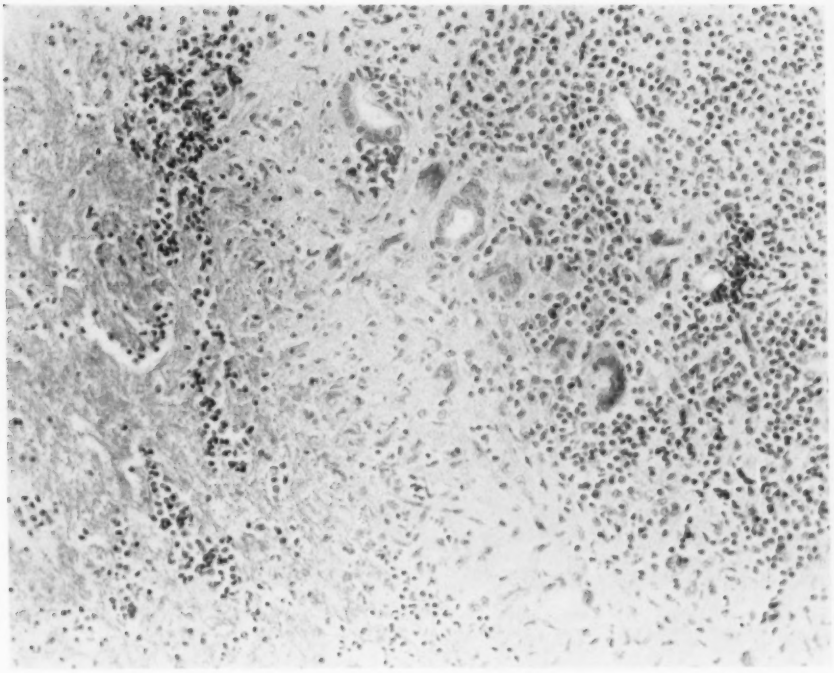

FIG. 2—Orbital biopsy. Higher magnification of the tissue shown in figure 1. (H & E; × 440).

tained chronic inflammatory cells. The epibulbar tissues, sclera, ciliary body and root of the iris were massively infiltrated by inflammation of the chronic granulomatous type which obliterated the normal architecture. The cellular changes resembled very closely those present in the orbital biopsy. Normal choroid (fig. 5) was replaced by areas of necrosis and dense accumulations of lymphocytes, plasma cells and fibroblasts. Scattered giant cells and engorged vascular channels were also evident. The most anterior portion of the retina was incorporated in the inflammatory tissue; more posteriorly it was elevated by organized exudate on the pigment epithelium, and in some areas by an eosinophilic substance containing red blood cells, chronic inflammatory cells and pigment-laden histiocytes. The retinal architecture was well preserved except for the absence of rod and cone processes. The optic nerve head protruded moderately and was covered by chronic inflammatory cells. The lens and the structures on the opposite side were not affected. The vitreous space contained scattered chronic inflammatory cells, and anteriorly showed evidence of recent hemorrhage.

GENERAL HISTOPATHOLOGIC REPORT

The layers of the heart were involved with necrotizing granulomatous reaction and arteritis except for the endocardium, which showed fibrous thickening. In ad-

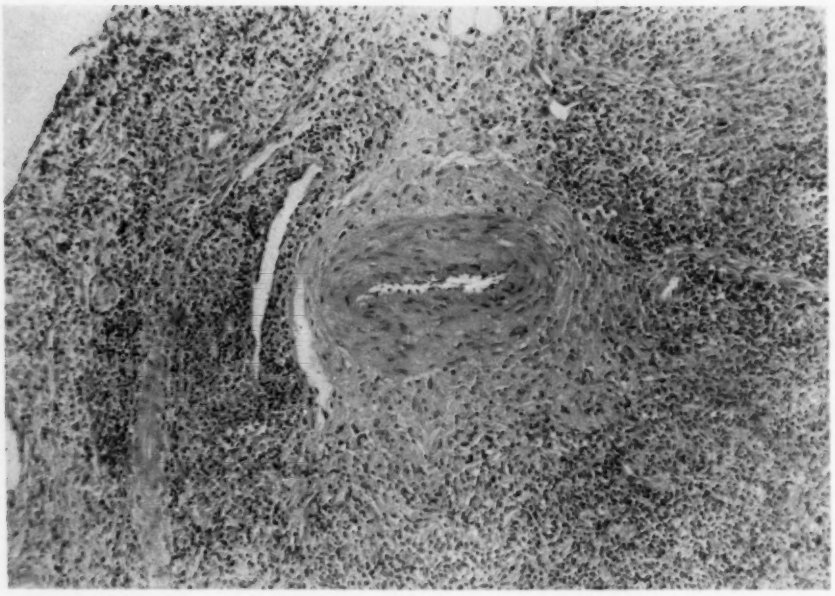

FIG. 3—Orbital biopsy. An artery with markedly thickened media and adventitia is surrounded by tissue densely infiltrated with lymphocytes, plasma cells and fibroblasts. (H & E; × 220).

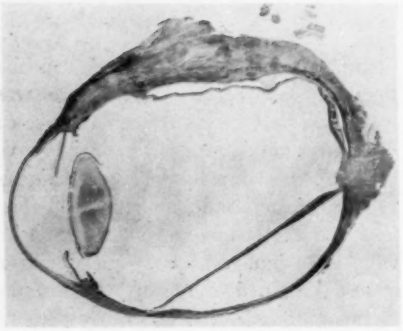

FIG. 4—Globe. The superior portion is flattened and massively thickened by granulomatous tissue which obliterates the normal architecture of the sclera, ciliary body and choroid. Anteriorly the retina is incorporated in this tissue and is detached posteriorly. There is edema of the nerve head. (H & E; × 10).

dition to chronic inflammation, many of the myocardial vessels showed fibrinoid necrosis of the walls and partial or complete occlusion of lumens of endothelial proliferation and blood cells (fig. 6).

Although much of the lower lung tissue, including the pleura, was uninvolved, all of the apical portions of both lungs were partly or completely destroyed by the same type of granulomatous inflammation (fig. 7). Here also many of the smaller vessels were thrombosed.

In a similar manner, large wedge-shaped areas of the kidneys were involved. Scattered necrotizing arteriolitis was present in addition to focal areas of periglomerular granulomatous reaction and tubular necrosis (fig. 8).

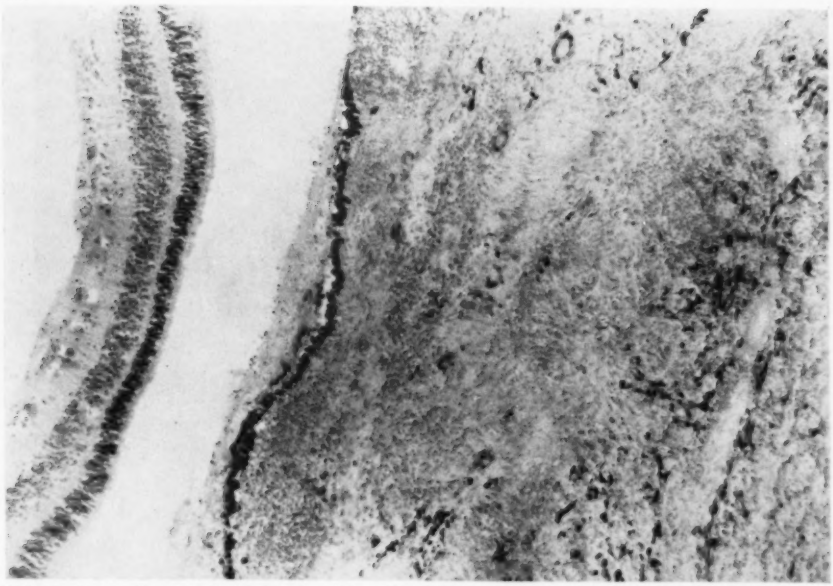

FIG. 5—Globe. The choroid is densely infiltrated by lymphocytes, plasma cells and immature fibroblasts. Scattered giant cells are present. The retina is separated from the pigment epithelium by a layer of organized exudate. (H & E; × 220).

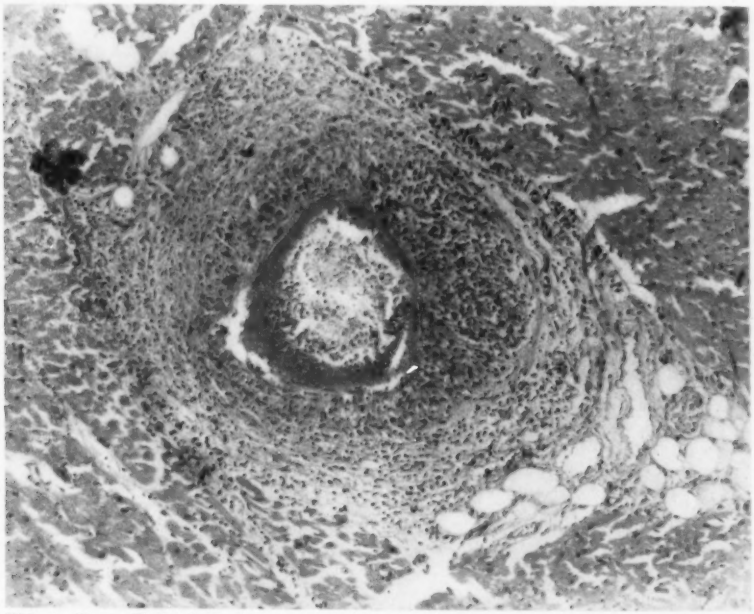

FIG. 6—Heart. Thickening and necrosis of the walls of an artery surrounded by chronic inflammatory reaction. The lumen is partially occluded by endothelial proliferation and polymorphonuclear cells. (H & E; × 440).

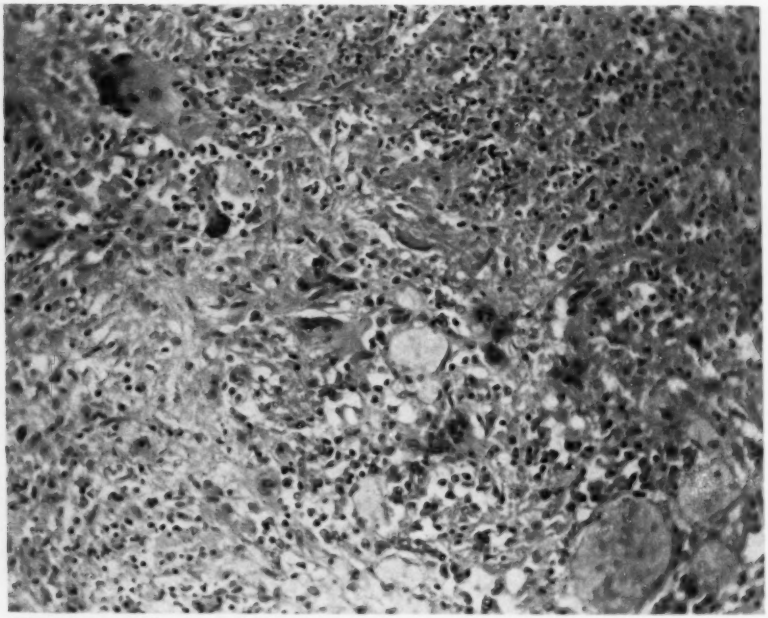

FIG. 7—Lung. The normal architecture is replaced by necrotic tissue containing lymphocytes, plasma cells, epithelioid cells and giant cells. (H & E; × 440).

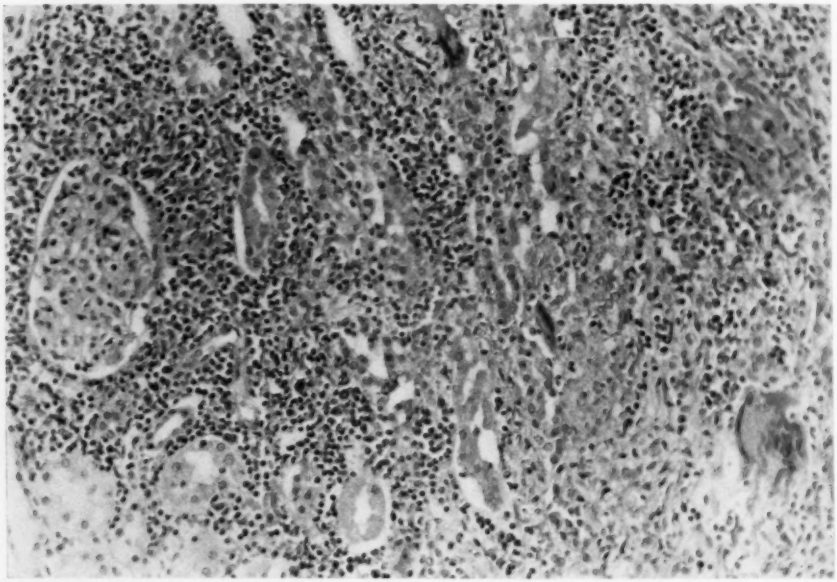

FIG. 8—Kidney. Intense granulomatous inflammation with periglomerulitis and tubular necrosis. (H & E; × 440).

SUMMARY

A fatal case of Wegener's granulomatosis is presented. The clinicopathologic ocular findings include scleritis, marginal ulceration and infiltration of the cornea, uveitis, inflammatory retinal detachment, and orbital granuloma.

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REACTIONS TO DISSOCIATION AND PRIMARY INSUFFICIENCIES OF THE VERTICALLY ACTING MUSCLES

A Discussion on the Pathogenesis of the A and V Syndromes

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IN 1938, Bielschowsky[5] separated the disturbances of the vertical motor muscles of the eye into four basic groups: (1) pure concomitant vertical deviations, (2) vertical deviations of a paretic origin, (3) deviations that show the features of unilateral or bilateral overaction of the inferior oblique muscle, and (4) dissociated vertical deviations.

In a previous report,[36] I pointed out that further developments made it advisable to modify that classification into the following one, which similarly comprises four fundamental groups: (1) concomitant (mostly latent) vertical deviations, (2) acquired paresis of the obliques and of the vertical recti, (3) unilateral or bilateral congenital insufficiencies of the same muscles, and (4) dissociated vertical deviations. To these, a fifth group of rare vertical imbalances—without, or with only a compensatory, actual deviation—was added subsequently, that of the pseudo-heterophorias due to a congenital or cicatricial displacement of the inner ocular layers.[37,38,43]

While little can be added to what is generally known on the subject of the anomalies pertaining to the first and fifth groups, and on that of the oculomotor paralyses of late onset, it may be said that a vast disagreement exists in the matter of the paralyses acquired early in life, of the congenital and, more often than not, bilateral insufficiencies of the vertical muscles, and of the so-called dissociated disorders. Although Bielschowsky emphasized the fact that vertical deviations showing the combined characteristics of several of the above groups are not seldom encountered, and observed that the complication of a defect of the paretic sort with dissociated deviations may occasionally render the analysis of the cases difficult, there has been an increasing tendency in recent years to confuse the motor disturbances of this latter kind with those of the former, and to consider most instances of what obviously are genuine, anatomically determined defects of the vertically acting muscles as sheer innervational derangements.

It is my purpose at this time to present some new data on the problem of the differential diagnosis between these conditions, to sum up the evidence available on the issue of the mechanical and peripheral, versus the functional and central, nature of some of them, and to examine the various other tentative explanations which have been advanced for the same.*

Presented at the Sixty-Fifth Annual Session of the American Academy of Ophthalmology and Otolaryngology, Oct. 9-14, 1960, Chicago.

*As much of what will be said presently emanates, in one way or the other, from the several publications devoted by the writer to the study of the oculomotor disorders over a period of years, it has been deemed necessary to refer repeatedly to most of these in the text, for which an apology seems in order.

It has long since been recognized and described that in cases of infantile strabismus where the well-known phenomenon of elevation in adduction exists, a relative divergence of the visual axes ordinarily occurs in sursumversion, as does some degree of convergence in direct deorsumversion, and this regardless of whether an exodeviation, an esodeviation, or no deviation whatever, happens to be present in the eyes-front position.[34] That, conversely, convergence in elevation and divergence in depression are usually encountered whenever a depression in adduction prevails[35] is likewise a notion now current in ophthalmic literature.

Since both the variations experienced by the horizontal deviation in direct up and down gaze and the upshoot or downshoot exhibited by the adducted eye in the lateral versions are similarly found in cases of clearly acquired palsy of the obliques and of the vertical recti,[27] it is not surprising that they have been ascribed to an overaction or an underaction of one or the other of these muscles.[16] Costenbader[9] has thus maintained that the condition wherein a lateral tropia is greater when the patient looks down and lesser when he looks up is probably associated with an abnormal activity of the vertical muscles.

In confirmation of this, late research work conducted on some very definite ethnic groups by Urrets-Zavalía, Solares and Olmos[44] has shown that a close relationship exists between the character of the cyclovertical disturbances occurring alone, or in combination with a lateral deviation, and that of the upper facial structures, as follows:

1. In the patients with a mongoloid type of facial development (hyperplasia of the malar bones, upward slanting appearance of the palpebral fissures, and straightened contour of the lid margins) where a vertical imbalance is associated with a horizontal strabismus, a unilateral or bilateral underaction of the inferior oblique prevails in cases of esotropia, and a similarly unilateral or bilateral overaction of the same muscle in cases of exotropia (fig. 1).

2. In the Caucasian patients with the reverse type of facial development (hypoplasia of the malar bones, antimongoloid obliquity of the palpebral fissures and S-shaped lower lid margins), the opposite is true; that is, an overaction of the inferior oblique in esotropia and an underaction of the same muscle in exotropia (fig. 2).

THE DISSOCIATED DISORDERS

Of the several reactions to dissociation (to be discussed here only in so far as the problems raised by their clinical interpretation are concerned); the most conspicuous, no doubt, is the alternating upward deviation which takes place on occlusion. This alternating *hyperphoria* (occlusion hypertropia) must be sharply distinguished from the alternating *hypertropia* seen in cases of horizontal strabismus with a bilateral overaction of the inferior oblique, which is permanent and in no way dependent upon the covering of one eye.[36,41] To alternating hyperphoria, Bielschowsky's darkening phenomenon[4] is closely related. In addition to an upward rotation, there usually occurs an intorsion of the covered eye and an extorsion of the opposite one. Also, in some cases the head is tilted toward the side of the fixing eye, and this even when the ocular deviation is permanent and the torticollis serves no apparent purpose, as it does, for instance, in the event of a unilateral palsy of the superior oblique, where it plays a clearly compensatory role.

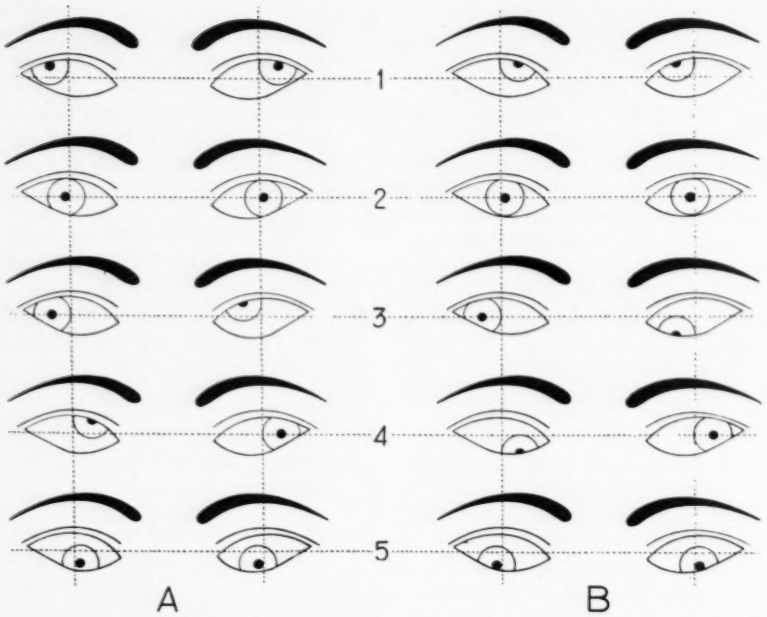

FIG. 1—Schematic representation of state of affairs prevailing in squinting patients with mongoloid type of facial development, in which a vertical imbalance exists in association with a horizontal deviation. Note the mongoloid obliquity of palpebral fissures and the straightened contour of almond-shaped lid margins; the hyperplasia of the malar bones referred to in the text is not shown. (A) If an exotropia is present in straightforward gaze (2), a further divergence in elevation (1), a relative convergence in depression (5), and elevation in adduction (3, 4) are encountered, as a result of the overaction of the inferior oblique muscles. (B) Whenever an esotropia is present in frontal gaze (2), convergence in elevation (1), divergence in depression (5), and depression in adduction (3, 4) are seen as the apparent result of an underaction of the inferior oblique muscles.
(Reproduced, with permission, from the British Journal of Ophthalmology.[44])

A manifest nystagmus of variable description is far from rare in the cases in which an alternating hyperphoria is either spontaneously present or may be elicited on examination; it may already be present in straightforward gaze, or only in the extreme conjugate rotations, whereby the rapid component is toward the side looked at. Yet, what belongs in propriety to the dissociated phenomena is the jerky, mostly horizontal, bilateral latent nystagmus which appears on occlusion of one eye, and whose rapid phase is directed to the side of the unobstructed eye.

Although in uncomplicated cases the direction of gaze has no influence whatever on the magnitude of the alternating hyperphoria brought about by occlusion, the circumstance that this anomaly can often be encountered in the cases of strabismus with not only a horizontal component, but a vertical component as well, has led several authors to believe that the upshoot of the adducted eye shown by many of these is due to a shading effect of the nose on that eye, and that it is equivalent to the upward displacement which appears under cover.

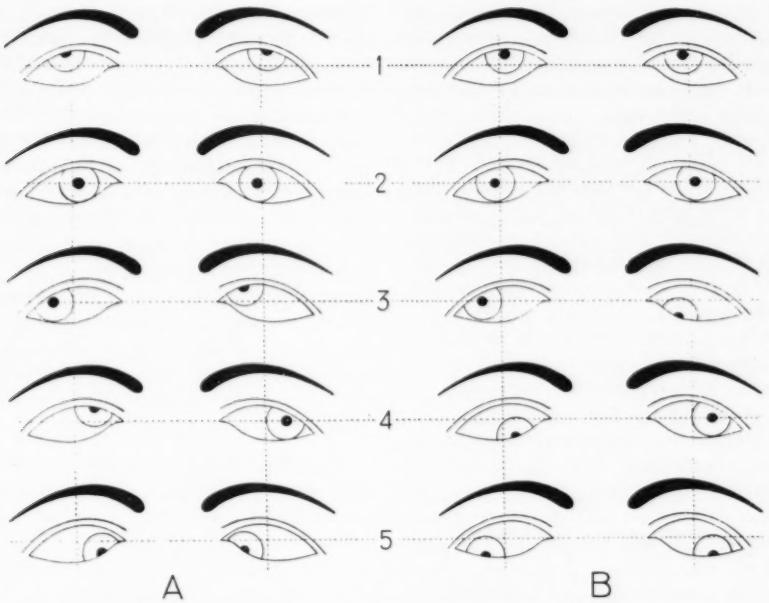

FIG. 2—Schematic representation of state of affairs prevailing in squinting children with Caucasian type of facial development, in which a vertical imbalance exists in addition to a horizontal deviation. Note the antimongoloid obliquity of the palpebral fissures and the S-shaped lower lid margins; the malar hypoplasia referred to in the text is not shown. (A) Whenever an esotropia is present in straightforward gaze (2), divergence in elevation (1), convergence in depression (5), and elevation in adduction (3, 4) are seen, as the apparent result of an overaction of the inferior oblique muscles. (B) If an exotropia is present in the eyes-front position (2), convergence in elevation (1), further divergence in depression (5), and depression in adduction (3, 4) are encountered, as the result of an underaction of the inferior oblique muscles.

(Reproduced, with permission, from the British Journal of Ophthalmology.[44])

That this is not so is demonstrated by quite a number of facts. Let it first be pointed out that the same upshoot is noticed in some large exotropias, where the nose can play no such role.[42] It may also be observed in patients with the V syndrome, who manage to keep their eyes straight in the frontal position, and who on uniocular occlusion show no deviation of the covered eye. If, in this latter type of case, the vertical deviation were innervational, it should appear not only in adduction but in whatever position a disruption of binocular vision happened to be occasioned by any of the dissociating devices. Similarly, in the case of permanently dissociated, strabismic eyes, the vertical imbalance should become manifest in no matter what position the nonfixing eye is occluded, or else be permanent, but not bound to occur solely in adduction. As on the other hand, such an upward displacement of the adducted eye practically never occurs spontaneously in the nonsquinting persons where an alternating hyperphoria can be provoked by occlusion, it might be said that the dissociated deviations are just as independent from the eventually adducted or abducted posi-

tion of the eye being investigated as those which have classically been attributed to a true hyperactivity or hypoactivity of a given muscle are uninfluenced by occlusion.

Further, it may be shown that in the case of elevation in adduction, no downward movement of the elevated (adducted) eye takes place when a darkened glass is held in front of the fixing (abducted) eye, as it does, instead, in that of the upward rotation produced by a covering screen. Indeed, it should be remarked that in some instances of the opposite phenomenon of depression in adduction, where a downshoot appears on internal rotation, there may be an added dissociated disturbance in the habitual sense which will cause the spontanously depressed, adducted eye to turn up when covered; this is the explanation of the apparently puzzling cases with an inferior oblique underaction[24] in which a hypotropic, nonfixing eye becomes hypertropic as soon as it is covered.

Moreover, it must be recalled that in the cases in which a significant vertical incomitancy appears during the conjugate movements to one or the other side, a marked difference ordinarily exists between the measurements of the horizontal deviation made in the straight up and straight down positions of gaze. This is, of course, consistent with the hypothesis that both the vertical incomitancy itself and the variations suffered by the horizontal deviation are due to the primary or even secondary hyperfunction or hypofunction of any of the vertical muscles, but not with that of a dissociated disturbance, which could not possibly be held responsible for the changes in position shown by the eyes as they rotate upon a transversal line. The dissociated disturbances, in fact, are never accompanied by any such changes, except in the cases in which a spontaneous upward or downward displacement takes place in the lateroversions. It is precisely in this variability of the horizontal deviation in direct up and down gaze—for which no satisfactory explanation is offered by the theories which see in all vertical disturbances the expression of a central, purely functional anomaly—that the essential criterion serving to distinguish between both conditions seems to lie. Besides, if the vertical displacement of the adducted eye were really of an innervational nature, it would be hard to understand how its upward or downward direction could be dependent, as it often is, upon the structural facial habits.[40,44]

It has been held, likewise, that if the upward or downward displacement exhibited by the adducted eye were truly due to an insufficiency of one of the vertical muscles, the vertical deviation should be more conspicuous in the oblique up and in, than in the oblique down and in, positions of gaze, or vice versa. This objection is not valid, as shown by the numerous cases of ancient acquired paralysis from which the patient recovered but which left as a permanent sequela a contracture or shortening of the direct antagonist of the originally diseased muscle: the vertical deviation which still appears as the affected eye enters or abandons the area in which the lack of equilibrium makes itself felt (that is, as the eyes move from one side to the other) no longer varies when they go above or below the horizontal plane, since the cause of the imbalance has become the new *static* relationship *(secondary comitance)* now existing between the pair of muscles in conflict, rather than a *dynamic* defect due to the insufficiency of one of them.

Only by assuming that no consideration was given to the possible occurrence of vertical defects of an other than innervational nature can Crone and Vel-

zeboer's statement be understood, that among the 922 children examined by them there were only four cases of paralytic squint.[12] In fact, it should be observed that no mention of the essential features of what have come to be known as the V and A syndromes may be found in the writings of the main advocates of the innervational theory.[10,11,21,22]

As noted by Anderson,[1] the incidence to such reactions to dissociation as latent nystagmus and alternating hyperphoria is low when confronted with the total number of patients with an altered motility. The frequency of the torticollis which, it is said, goes to compensate the intorsion of the fixing eye, is still less. In my experience, these phenomena were present in a mere 15 per cent of the cases in which a vertical disturbance of some sort was detected. Hence, it would be difficult to assimilate the whole lot of these to defects which are far from prevalent.

True, cases of esotropia are encountered which exhibit a seemingly secondary, or spurious, vertical disorder, usually in the form of a moderate upshoot of the adducted eye which appears suddenly at the end of the extreme horizontal excursions.[29,45] This I have seen, although not very frequently, in the cases of purely accommodative, permanent esotropia of late onset in which a previously nonexistent vertical component appeared after some months or years. As a rule, facial abnormalities, as described above, and important variations in the angle of squint as the eyes move on a transversal axis are then absent. In contradistinction to this, the deviations attributed to an insufficiency of one of the vertically acting muscles come forth progressively in the course of the lateroversions, in strict proportion to the extent of the latter, and are of a fairly constant degree for any given quantum of inward or outward rotation (fig. 3).

It has also been maintained that the same phenomenon of elevation (and more seldom of depression) in adduction may be recorded as a late motor complication in the cases with a total or partial loss of vision in one eye, and that this is strongly against the view which assumes it to be anything but an innervational trouble. Actually, what appears as the consequence of unilateral blindness—and even after the evisceration of one eye, when it may affect the position of the scleral stump and, indirectly, of the prosthesis—is a disturbance resulting from long-standing dissociation. Since it is veritably functional in nature and eminently variable, this disturbance shares by the same token none of the aforementioned traits of the deviations due to the excessive or defective action of some of the extraocular muscles. Particularly, it is never accompanied by any appreciable changes in the importance of the horizontal deviation in direct up or down gaze.

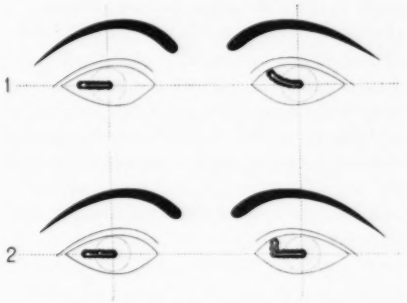

FIG. 3—In part 1, the hypertropia due to an overaction of the left inferior oblique is illustrated: the deviation appears gradually in the course of dextroversion and is strictly proportional to the extent of the latter. Part 2 shows, instead, the seemingly secondary upshoot of the adducted eye which occurs suddenly at the end of the horizontal excursions; this may be of innervational nature and is not associated with convergence or divergence of the visual axes in straight up and in straight down gaze.

Sure enough, these changes may be present in cases of *anisesthetic* strabismus, when a pre-

existing vertical imbalance of an *ophthalmoplegic* type,[39] which until then had been kept in check by the necessities of bifoveal fixation, is set free once this turns out to be no longer possible. As will be seen presently, a real overaction or underaction of a certain muscle would be all the more apt to occur, the more marked the horizontal deviation which appears occasionally in the wake of a sensorial disturbance.

The inconsistency of the argument that a case can be regarded as paralytic only when diplopia is present,[17] and when the retinal correspondence is normal, as in the Stilling-Turk-Duane retraction syndrome, is obvious. If binocular single vision may still be secured in at least some part of the field of fixation, either by the mere expedient of looking in a direction where the palsied muscle does not come into play, or with the aid of torticollis, a normal sensorial relationship will be attained and/or preserved. When, on the other hand, no such thing is possible, as for instance in the event of a congenitally determined, bilateral insufficiency of one of the vertical muscles, an abnormal retinal correspondence must necessarily develop. The fact that in some such cases the head is tilted toward the side of the fixing eye has been considered a proof of the innervational character of the vertical disturbance; yet, that this torticollis—which, being unable to keep the eyes in proper alignment is evidently aimless—may be a reaction due to a pre-existing dissociation is one thing; that it be taken as a sign of the functional nature of the basic derangement leading to the dissociation itself is quite a different matter.

It has also been said that the eventual disappearance or pronounced reduction of the vertical anomaly after surgical correction of the horizontal squint constitutes a palpable demonstration of the former's secondary nature. Far from it, it only goes to show that just as in the case of, say, an acquired paresis of the left superior oblique, the vertical deviation is greater in dextroversion than in levoversion, so in that of a congenital weakness of the same muscle accompanied by a left-sided convergent strabismus where the affected eye is definitely elevated, the vertical disparity will become less manifest as, by virtue of surgery on the left medial and lateral recti, the eye leaves the adducted position where its relative height is chiefly dependent upon the activity of both the left superior and inferior obliques. A proportionality of sorts exists then between the apparent severity of the vertical deviation to which a given defect of one of the vertically acting muscles gives rise, and that of the attendant horizontal strabismus. Thus, it would be well to remember that whereas in some cases the vertical disturbance does disappear with the correction of the lateral deviation, in many more it only shows the reduction to be anticipated from the correction experienced by the latter, or not even that.[14,39,41*]

The same explanation may be advanced, of course, for the cases in which the general pattern of the A and V phenomena happens to be favorably influenced by surgical correction of the horizontal recti alone; as stated by Costenbader,[8] though, this is unfortunately by no means the rule.

If the vertical deviations in these cases were in reality of a functional nature, it would be expected that they would be permanently overcome by the normal compulsion to bifoveal fixation as soon as the mechanical obstacle represented by the horizontal defect is removed and single binocular vision has

*As to the interpretation of the fact that occasionally a V syndrome may turn into an A syndrome after the correction of the lateral tropia, see Urrets-Zavalía, Solares and Olmos.[44]

been re-established. However, there would still be no reason why they should not always become evident (at least in the early stages after the operative correction) whenever the eyes were alternately occluded, which is certainly not the case.

It would seem, therefore, that the innervational troubles (which are only the aftermath of the disruption of normal binocular vision brought about by a number of factors, and which, whatever the mechanism involved in their materialization, supervene as so many release phenomena from the normal restraint entailed by bifoveal fixation) happen to have erroneously been identified with some of the dissociating agents. Thus, what is merely an effect of untimely dissociation has come to be taken as the cause for the latter, that is, as a primary perturbation. In fact, those reactions to dissociation have nothing to do with the ultimate cause of the dissociation itself. Most of all, a confusion between the alternating hypertropia and the elevation in adduction determined by an overaction of the inferior oblique (which may be due to an insufficiency of either its direct antagonist, the homolateral superior oblique, or its yoke muscle, the contralateral superior rectus) and the alternating hyperphoria of a truly functional nature appears to be prevalent.

An objection to Piper's view that the upshoot of the nonfixing eye seen in strabismus surso-adductorius represents a consolidation of alternating hyperphoria,[26] lies in the cases where this latter condition appears as a late complication of an acquired (for example, traumatic) superior oblique palsy of early onset. Being obviously secondary, the alternating hyperphoria cannot be regarded as the source of the pre-existing elevation of the affected eye in adduction, notwithstanding the fact that the vertical deviation now loses its previous constancy and becomes variable.

Incidentally, it can be said that the postulate according to which occlusion hypertropia results from an exception to Hering's law, in the sense of an occasionally occurring unilateral optomotor stimulation, might not be at all unfounded.[23] It is Verhoeff's belief[46] that a hypoplastic fourth nerve nucleus associated with what he terms a monocular conjugate insufficiency should be held responsible for this condition. This could well be true, though the fact remains that a typical alternating hyperphoria happens to be encountered also in cases of paresis of the inferior oblique, the very existence of which may then be obscured. At any rate, Verhoeff's criticism of the theory of Bielschowsky,[4] according to which this double hyperphoria is due to alternating and intermittent excitations of both centers for vertical divergence, retains its validity. It may be that the reactions to dissociation are the outcome of a faulty development of the optomotor reflexes; yet, it would be wrong to think that this could similarly apply to strabismus, which is generally the reason for, rather than the consequence of, that delayed or perverted development.

To sum up, it thus appears (1) that if the reactions to dissociation, alternating hyperphoria in particular, are accidentally present in the frequent cases of strabismus with a unilateral or bilateral insufficiency of one of the vertically acting muscles, from which they must be sharply distinguished, they are also met with in others where no such an insufficiency is detected; (2) that alternating hyperphoria, as a reaction to dissociation, is in no way influenced by the eventually coexisting relative divergence or convergence of the visual axes in the direct up and down directions of gaze; (3) that alternating hyperphoria as such is not affected, either, by the horizontal rotation, and that it may exist independently of whether an elevation

or depression occurs spontaneously in adduction; (4) that the fact that both the variations shown by the horizontal deviation in sursumversion and in deorsumversion, and the vertical displacements of the adducted eye, are firmly integrated in the A and V syndromes makes it highly probable that they are of a common origin; and (5) that the reactions to dissociation should accordingly be appraised as merely adventitious phenomena in all discussions on the causes of the disjunction itself.

OTHER TENTATIVE EXPLANATIONS OF THE CYCLOVERTICAL SYNDROMES

Being a firm supporter of the opinion that disturbance of the oblique muscles is a major factor in the production of the features peculiar to the A and V syndromes, Jampolsky[18,19] has furnished abundant proof in behalf of the necessity for vertical surgery in many of these cases. He contends:[18]

> . . . When the exodeviation in down gaze is more than 45 prism diopters, compared with near orthophoria in up gaze, with only a small degree of exodeviation in the primary position, an operation upon the horizontal recti alone is usually unsatisfactory because of the confining amount allowable for primary position alignment and because it does not significantly ameliorate the horizontal noncomitancy.

His contention has been borne out by both his and Fink's operative results.[14]

The prominent role attributed to the oblique muscles in these cases has been questioned on the grounds that the horizontal action of such muscles is slight; it is slight, indeed, so long as the visual axes move on a strictly horizontal plane, but this in no manner means that it will still be so in elevation and in depression.[41]

I do not believe, however, that the overaction of the superior oblique often encountered in the white races in cases of *exotropia* should be ascribed to a contracture resulting from the slackening of this muscle brought about by the exodeviation. In the first place, one does not see why the contracture and the ensuing overaction affecting the superior oblique should spare the inferior oblique; cases in which both the oblique muscles of one eye are overactive must be extremely rare, for I have never observed one. Secondly, it is not clear why, when the exodeviation is unilateral, the overaction of the superior oblique should be apparent not only on the side of the squinting eye but in that of the fixing eye as well, where owing to the normal position of the globe no shortening of the oblique muscles could take place. Also, the fact that a symmetrical or asymmetrical overaction of the superior oblique is present in cases of alternating exotropia, where no contracture should be allowed to develop, would be difficult to explain.

Furthermore, it must be pointed out that in the mongoloid type of facies an overaction of the superior oblique may regularly be detected in cases of *esotropia*, in which the above assumption certainly does not apply. As, again, a bilateral overaction of either the superior or the inferior oblique may, and not infrequently does, occur in patients with no lateral deviation in straightforward gaze, it does not seem that the vertical imbalance could reasonably be regarded as secondary to the horizontal strabismus, which may be very slight or even entirely absent (figs. 4 and 5).

The tenet that the vertical defect is primary and not secondary to the horizontal deviation does not necessarily imply that a paralysis of one of the vertically acting muscles must have come into play. As Jampolsky[18] puts it, it would no doubt be a peculiar lesion which could result in a singled-out bilateral palsy of, for instance, the inferior rectus muscle. Rather than to talk

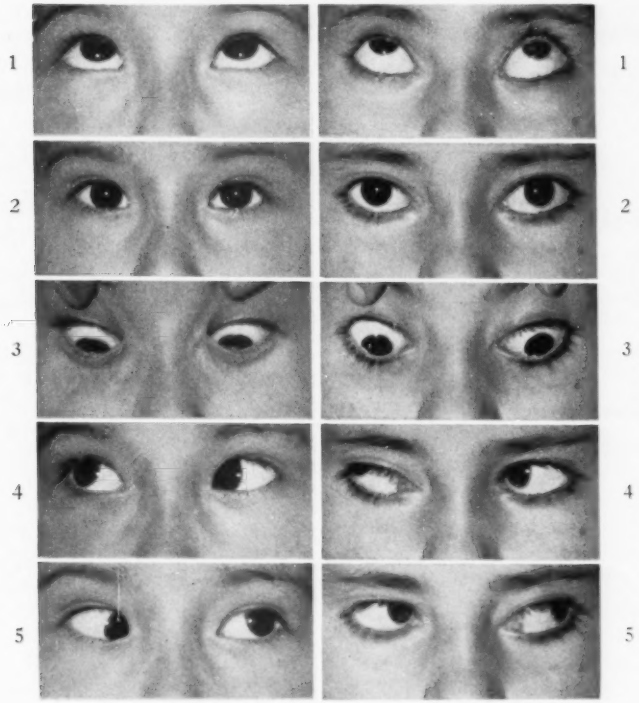

FIG. 4—(A) Bilateral underaction of inferior oblique muscle, more noticeable on the right side. In frontal gaze (2) and in elevation (1), eyes nearly straight (alternating suppression with house-fly test); slight alternating exotropia in depression (3); in dextroversion (4) and in levoversion (5), slight depression of the adducted eye.

(B) Marked insufficiency of left inferior oblique (reproduced, with permission, from the A.M.A. Archives of Ophthalmology[42]). In straightforward gaze (2), small degree of left exotropia, which remains unmodified in direct elevation (1), and becomes much more obvious in depression (3); in dextroversion (4), a downshoot of the adducted left eye is seen; in levoversion (5), no vertical disturbance appears.

Note in both patients, normal development of malar bones, mongoloid obliquity of palpebral fissures, and almond-shaped contour of lid margins.

of a *paralysis* in the true sense of the word, it would, therefore, be preferable to resort here to the term *insufficiency*, which would be free of the several etiologic connotations of the former. At any rate, this would agree with the fact that an apparent insufficiency of the vertical muscles does occur in the cases under consideration, and this according to well defined laws relating the motor anomalies to the prevailing facial characteristics. More will be said below on the possible nature of such insufficiencies.

It has been Cords' claim[7] that an oblique scleral insertion of the medial or the lateral rectus muscles could account for the upshoot or downshoot encountered in adduction. That it might also explain the difference between the meas-

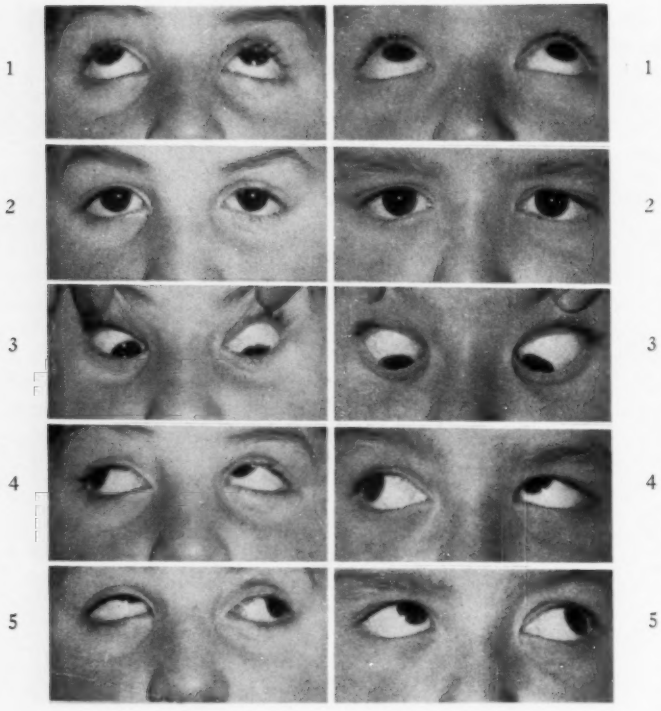

FIG. 5—(A and B) Bilateral inferior oblique overaction. In straightforward gaze (2), only a small amount of left esotropia is present; in elevation (1), a definite divergence of visual axes takes place, while in depression (3) the esodeviation becomes more marked; in dextroversion (4) and in levoversion (5), a pronounced upshoot of the adducted eye occurs (which, in A, is more evident on the right, and in B more evident on the left side). Note in both cases hypoplasia of cheek bones, antimongoloid slant of palpebral fissures, and S-shaped lid borders.

urements of the horizontal deviation made in the direct up and in the direct down field of gaze, has been shown by Anderson,[2] who writes:

> If, for example, the insertion of the external rectus was closer to the limbus in its upper part than was normal, it would tend to increase abduction in elevation.

Yet, it cannot be said that this viewpoint has received much support from the dissections required to surgically expose those muscles, which have consistently failed to show the existence of such anomalies of insertion.

According to Urist,[31,32,33] the V syndrome should be attributed to a bilateral overaction of the medial rectus in cases of esotropia, and to an overaction of the external recti in cases of exotropia. In the A type of case, the greater deviation down in exotropia would in turn be due to weakness of the internal recti, while the greater deviation up in esotropia could be attributed to an underaction of the external rectus muscles. This presupposes, of course, that the medial rectus has its greatest effect in depression, and that the lateral rectus is

particularly active in elevation, both of which surmises are still unproved and are not in agreement with the findings of Ohm,[25] who demonstrated that when the external rectus is paralyzed, the deviation is maximal on looking down, and that it is largest on looking up in the rarer cases of isolated palsy of the internal rectus.

It ought to be pointed out, also, that in many cases of V esotropia the horizontal error, while becoming lesser in elevation, does not exhibit the marked increase in depression which should be present if there really existed an overactivity of the medial rectus, and if such an overactivity were to manifest itself particularly in depression. *Mutatis mutandis,* the same applies in the many cases of A esotropia where the deviation does not augment in elevation despite the fact that it still diminishes in depression, and in those, equally numerous, of V and A exotropia with a comparable behavior. In actuality, the motor anomaly deports itself in these cases as in the letters γ (or Y) and λ (or Λ).

What is more, in cases of periodic, purely accommodative esotropia, in which a marked convergence in down gaze should be expected to occur on account of the prevailing abnormal activity of the internal recti, the visual axes, instead of turning in, turn out in depression, as they also do in elevation, thus regaining their parallelism (fig. 6). Nonetheless, that a hyperfunction of the internal recti does exist in them has been shown by the good results obtained with a recession of the medial recti in the not rare patients in whom some residual esotropia remains for near after the full hyperopia has been neutralized by glasses.[9]

Similarly, in many cases of intermittent exotropia precariously compensated

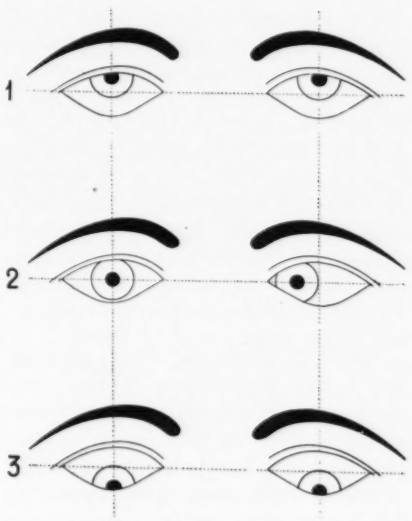

FIG. 6—"X type" esotropia: in straightforward gaze (2), a purely accommodative convergent strabismus may be permanently or intermittently present; in elevation (1) *and* in depression (3), however, the visual axes regain their parallelism.

in frontal gaze *(exotropia e relaxatione*[3]*)*, an insurmountable outward swing of the eyes takes place in sursumversion as well as in deorsumversion, provided that no vertical imbalance is present in the lateral rotations (fig. 7). * On the strength of this observation one could safely assume that the agent effective in bringing about the A and V phenomena must also be responsible for the vertical deviation which appears in adduction.

It should further be noticed that in confirmed cases of convergence insufficiency, neither the A phenomenon nor an underaction of the superior obliques

*If, by reason of its descriptive value, an alphabetical image were to be used in this case, as it has in that of the A and V syndromes, I believe that the expression *X syndrome* would be perfectly in order.

(with the attending depression in adduction) has ever been reported to occur. Finally, one cannot but wonder at the conclusion that in the cases in which an esotropia appears in direct up gaze and an exotropia in direct down gaze, or vice versa, with little or no deviation in the eyes-front position, an underaction of both the lateral and the medial recti, or an overaction of the same muscles, must perforce exist if the hypothesis under consideration were true.

The proposition according to which the A and V syndromes result from a dysfunction of the horizontal recti goes naturally hand in hand with the surmise that the accompanying anomalies of the vertical muscles that appear in the lateroversions are functional, or due to an abnormal central stimulation akin to that accountable for the Marlow effect. Yet, nothing could be farther removed from the irregular and permanently variable deviations brought about by the prolonged occlusion of one eye than the malpositions classically attributed to an overaction or underaction of one of the vertical motor muscles, which are quite constant for each position of gaze and appear in gradual progression as the eyes shift from one side to the other.[42]

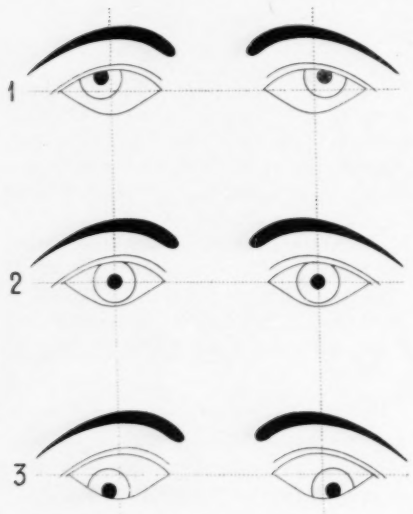

FIG 7—Periodic exotropia with "X syndrome": orthotropia in the eyes-front position (precariously, and only intermittently, compensated exodeviation) (2); both in upward (1) *and* in downward (3) gaze, an insurmountable outward swing of one or the other eye takes place, provided that no vertical imbalance becomes apparent in the lateral rotations.

The fact should be borne in mind, too, that only exceptionally can a straightening of the eyes in all positions of gaze be attained in these cases by surgical procedures on the horizontal muscles alone, and this due to the lack of comitance, both in the vertical and in the horizontal sense, still persisting even after the patient has become orthotropic, or nearly so, in the primary position.[42] Anderson[2] also thinks that better results may be achieved if more attention is paid to defects in the oblique position, and more treatment directed at the offending vertically acting muscles.

Even if one were to admit that a dysfunction of the medial and lateral recti is the underlying cause for the A and V phenomena, it is still far from clear what exactly must be understood by that term. From all that has been published on the subject, it appears that an overaction or an underaction of either of these muscles would result from excessive or defective stimulation, namely, from a neurogenic disturbance.

Breinin's remarkable electromyographic studies of vertically incomitant horizontal strabismus merit special consideration.[6] Although few (a total of 10 for the A and V types of esotropia and exotropia), his tracings seem to show that in some cases a greater activity of the lateral recti, associated with an inhibition of the medials (as indicated, respectively, by an increased and by a de-

creased firing) is responsible for both the A and the V type of exotropia, the only difference being that in the former these changes were registered in downward gaze, while in the latter they were observed in upward gaze. Corresponding alterations occurred occasionally in A and V esotropia.

This, however, is hard to reconcile with the fact that the pattern of the vertical imbalance and that of the changes experienced by the horizontal deviation are often dependent upon the character of the facial structures, for it cannot be seen why a centrally determined hyperfunction of the internal recti should occur in esotropic patients with an antimongoloid type of facies, and an underaction of the same muscles of an equally central origin in those with a facies of the opposite sort. The same applies to the view purporting that inferior oblique overaction should be looked upon as a synkinetic, centrally conditioned phenomenon.[15] It is to be noted, besides, that nothing in Breinin's results warrants the assumption that an underaction of a given muscle rather than an overaction of its direct antagonist, or vice versa, should be blamed for the incomitance encountered in the horizontal deviation.

In a few of his cases, moreover, the horizontal recti evinced no particular fluctuations in their innervational levels, which confronts us with a combination of conflicting factors. Tamler, Jampolsky and Marg[30] have remarked that because of the normal variation in activity of the horizontal recti in tertiary plane movements, it appears misleading to draw conclusions regarding causation of the A and V syndromes without adequate sampling, and that the mere presence of an increased electric activity may only reflect the new position of the eyes rather than tell us why the eyes moved to this new position.

Consequently, it can be said that considerable progress will still have to be made in this direction before final judgment may be passed on the real significance of the data assembled so far. In any event, the fact that the vertical muscles were found by Breinin to exhibit only the expected recruitment in their fields of action in no way precludes their possible role as agents for the variations displayed by the lateral deviation in sursumversion and in deorsumversion. As a matter of fact, it is not so much as if the seemingly affected muscle did not contract (or contracted in excess), but rather as if, for some hitherto unknown reason, its contraction proved mechanically less (or more) effective than that of its contralateral synergist.

Little can be put forth yet as to the intimate mechanism of the enhanced or reduced efficacy with which the contraction of a supposedly sound muscle happens to be translated into a motion of the eyeball. Nevertheless, it would seem that the alterations in the reciprocal positions of the scleral versus the osseous insertion of the different extraocular muscles—with the ensuing changes in the position of the several muscles planes—which are apt to occur in accordance with the variations in the position and shape of the orbits, might account for their overaction or underaction and for the relationship found between the character of the motor anomaly and that of the cephalic scaffolding.

It is not to be thought for one moment, however, that just because in cases with clear-cut mongoloid or antimongoloid features the disturbances encountered in the sphere of the vertically acting muscles are nearly always of a distinct class, so in every case with similar motor defects such facial traits must necessarily be present. In the light of what has been observed in squinting children with unmistakable mongoloid

or antimongoloid features, one might suppose, though, that motor anomalies of a comparable kind, although more or less strictly confined to the province of the extraocular muscles, lie at the bottom of the cases of A and V esotropia and exotropia with no visible obliquity of the palpebral fissures, where the facies is of no definite type.[44]

Be that as it may, the point must be stressed that the attempted explanation is scarcely more than conjectural, the available evidence merely indicating that the vertical motor disturbances herein referred to are based on a peripheral, probably morphologic defect. Sachsenweger and Lukoff's observations on the frequent occurrence of both horizontal and vertical ocular deviations in cases of facial asymmetry seem to uphold this conclusion.[28]

The possible part performed in the syndromes described by the muscle sheath abnormalities reported by Johnson[20] under the name of "adherence syndrome," though perhaps not inconsiderable, is still unclear, as is that of the interesting developmental changes encountered by Fink[13] in the case of clinically demonstrable vertical muscle defects.

CONCLUSIONS

Now that this discussion is about to come to an end, some misgivings have started to assail me. It suddenly occurs to me that most of what has been said may appear as only so much hair-splitting. Yet I do not see how one could proceed to unravel the tangled skein of such complex problems without an articulate approach to their many intricacies. This is what we forget time and again in our everlasting mania for simple theories at the expense of complicated facts.

On the one hand, two entirely different clinical entities, that is, the dissociated deviations as typified by alternating hyperphoria and the vertical malpositions due to the insufficiency of a given muscle, have come to be erroneously identified by those who see in them both only an innervational disturbance, and who, by so doing, are hard put when it comes to explaining the stark variability in up and in down gaze of the accompanying horizontal deviation which occurs in the latter but not in the former.

On the other side, heedlessness to the circumstance that the changes shown by the horizontal deviation are regularly coupled with elevation or depression in adduction, that is, with an overaction of either the inferior or the superior oblique, has led different authors to overlook the suggestion that the medial and lateral rectus muscles are not alone affected.

Thus, just as in the one case a unique explanation was sought for two utterly disparate sets of facts, so in the other two distinct explanations had to be advanced for facts which ordinarily come together and which can be ascribed to a common cause. In this connection, it would be well to recall, though in modified form to better suit the present situation, Jampolsky's[18] remark that it seems apparent that the obliques and the vertical recti are responsible for the disorders at issue, since one may *see* the anomaly of the obliques as overaction; one may sometimes *feel* it by the forced duction test; one may *cause* it by a tenotomy of one of them in otherwise normal eyes; one may *cure* it by a weakening or strengthening procedure on the overactive or underactive vertical muscle; and one may *compare* its features with observations of acquired vertical muscle palsies.

I am persuaded, therefore, that in at least a large number of cases both the vertical deviations which appear in the lateroversions and the modifications undergone by the angle of squint as the eyes rotate on a transversal axis are derived from a primary insufficiency of the vertically acting muscles, which may operate as an unconquerable mechanical obstacle to the development of normal binocular vision and in so doing give rise to an added horizontal strabismus and/or to innervational troubles. I also believe that the various kinds of combined horizontal and vertical disturbances occur not haphazardly, but in accordance with definite laws which relate them to basic developmental facial standards.

In closing, I would like to paraphrase A. H. Thomas's words on an altogether different subject* by saying that in the study of the insufficiencies of the vertically acting muscles, one perceives certain tendencies in the motor behavior about which it is possible to generalize. These generalizations or statements of principle may be called laws, an expression which, in the view of many, would be quite misleading if by "law" we were to understand a rule which is both immutable in its relation to the phenomena it represents and invariable in operation. Although in things biological, and more especially clinical, a great deal of uncertainty is still readily apparent, this does not mean that these generalizations have no value, for they reassert principles which must always be considered.

SUMMARY

In cases of strabismus in which, irrespective of the convergent or divergent character of the horizontal deviation, the well-known phenomenon of elevation in adduction exists, a relative divergence of the visual axes is generally met with in direct elevation, as is also some degree of convergence in depression. When, conversely, depression in adduction prevails, divergence in deorsumversion and convergence in sursumversion are usually encountered. That these syndromes are frequently due, respectively, to an overaction of the inferior oblique and to a primitive or inhibitional underaction of the same muscle seems supported by a number of facts.

In some cases of long-standing dissociation of the eyes—whether occasioned by squint or by the reduced value of the retinal image in one eye—and, more rarely, in persons having binocular single vision under normal conditions, innervational anomalies in the form of alternating hyperphoria, of latent nystagmus and of conjugate cycloversion are seen to appear on uniocular occlusion.

In recent years, there has been an increasing tendency to confuse the motor disturbances of this latter kind with those of the former, to which they are often associated, and to consider most instances of what obviously are genuine insufficiencies of the oblique and of the vertical rectus muscles as functional disorders. On the other hand, others have tried to explain these vertical defects, or at least some of their consequences, by the various assumptions that they are derived either from a contracture of one or both oblique muscles, which in turn would be secondary to the eventually coexisting lateral deviation, from a variation in the abducting or adducting power of the horizontal recti, which would become manifest whenever the lines of regard leave the horizontal plane, or from a slanting insertion of these latter muscles.

(*) Thomas, A. H.: A Refresher Course in Economics, London, George Newnes, 1956.

On the basis of newly acquired evidences, the issue is discussed and the conclusion reached that in a large number of patients a true, anatomically determined disturbance of the vertically acting muscles obtains. Considerations on the diagnostic problems involved are presented.

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DISCUSSION

FRANK D. COSTENBADER, M.D.: Professor Urrets-Zavalía has, in his presentation, made several excellent points. With most of them I can thoroughly agree, and can rarely disagree.

I have long been disturbed by the careless way in which the term *double hyperphoria* is bandied about. It becomes immediately apparent that most of those who use the term do not appreciate the fact that there may be many causes for a double vertical deviation. And the assessing of the cause is most important to the proper treatment.

The use of the term *double hyperphoria* (often called *dissociated vertical divergence*, or *dissociated hyperphoria*) to designate those cases of vertical deviations which are functional in nature seems wise. They may be characterized as follows: (1) They are latent at times and manifest at others, and (2) are dependent upon the degree of dissociation and not the direction of gaze. (3) They show intorsion of the covered eye and extorsion of the uncoverd. (4) Bielschowsky's darkening phenomenon and, at times, (5) head tilt are present, and (6) a latent nystagmus is elicited. Professor Urrets-Zavalía also states that double hyperphoria is not specifically associated with upper facial anomalies (mongoloid or antimonogoloid facies), or with the A and V phenomena. These last two points I can neither confirm nor deny from our clinical experience, but I do agree with the other differential points he has made.

Rightly, the author has said that vertical surgery for double hyperphoria is most unwise, and that only horizontal surgery which will allow greater horizontal association should be performed.

In contradistinction to double hyperphoria, double hypertropia usually shows (1) a difference in the degree of character of the vertical deviation in the various fields of gaze, (2) slow progressive elevation of the higher eye on adduction, (3) the presence of A and V phenomena, and (4) a close association with the character of the upper facial configuration (mongoloid or antimongoloid). Again, I can agree with the first two criteria, but personal experience will allow me neither to refute nor to confirm the last two. I will heartily agree with the thought that an absolute distinction between "double hyperphoria" and "double hypertropia" is often difficult to make.

In double hypertropia, vertical surgery is often indicated, while any horizontal surgery will largely influence the vertical deviation by changing planes of action of the vertically acting muscles.

It does seem evident that while double hypertropia may often be the *cause* of the dissociation, double hyperphoria is the *result* therefrom.

The other section of Professor Urrets-Zavalía's paper, dealing with the so-called A and V syndromes or phenomena, their possible causes, and the role played by the upper facial development, interests me equally.

I am in thorough agreement that the A and V syndromes are largely associated with dysfunctions of the vertically acting muscles. These same dysfunctions may be on a paretic basis (and I am sure at times they are), but often are anatomically determined deficiencies. Thus, the suggestion that the term *muscle insufficiency* be used in place of the term *paresis* seems wise, since no true paresis may be present.

Among the suggested causes of the A and V phenomena is either functional or organic dissociation due to the horizontal recti on the one hand, and similar dysfunction of the vertically acting muscles on the other hand. There is evidence to support all of these various contentions.

Functional dissociation due to dysfunction of the horizontal recti as a cause has been strongly supported by Urist, and certain electromyographic investigations would seem to support this theory. Though I am in general agreement with Professor Urrets-Zavalía that the obliques are chiefly at fault, I must also agree that in a significant percentage of cases, *horizontal* surgery has definitely improved the A and V phenomena in our office practice. For example, in 29 cases of A-esotropia in which only the horizontal muscles received surgical correction, A phenomenon improved 52 per cent and a similar finding was true in A-exotropia. An improvement of the "V" up to 65 per cent was noted in V-esotropia and V-exotropia surgical correction from horizontal surgery alone.

Despite this rather satisfying degree of improvement, we noted however, that *oblique* surgery alone improved A-esotropia 75 per cent and A-exotropia 86 per cent, and when horizontal and oblique surgery were combined, average improvement of 80 per cent was obtained.

These somewhat confusing statistics suggest that both horizontal and oblique surgery improve the A and V syndromes but that the A syndrome responds better to oblique surgery, while the V syndrome responds about equally to either type.

On the other hand, organic lesions involving the extraocular muscles are also known to be associated with the A and V phenomena. Anomalies such as grossly fibrotic or paralytic muscles are often causes of A and V phenomena. I recall two cases of complete fibrosis of the inferior recti which caused a marked A-esotropia due to gross restriction of elevation and exaggerated adduction on attempting to elevate. In like manner, a totally fibrotic lateral rectus causes "exotropia with X." Further, Brown's "superior oblique sheath syndrome" will often be associated with A-esotropia, and the retraction syndrome frequently with A-exotropia. It is then apparent that gross extraocular muscle anomalies are frequently associated with both A and V.

It is reasonable to suppose, as was well pointed out by Professor Urrets-Zavalía, that less gross anatomical anomalies may also be associated with and probably cause A or V. The great variety of insertional variations of the inferior oblique, as so well demonstrated by Fink, the variety of adherences between the inferior rectus and the inferior oblique, and the superior rectus and superior oblique, and the even less evident insertional anomalies of the rectus muscles, may all so influence the amount and plane of action of these muscles that A and V are the result.

Now, again, Professor Urrets-Zavalía has presented the rather convincing evidence that the variations in the upper facial character of individuals may well influence the shape of the orbit, thus influencing the origin of the oblique muscles especially, and finally influencing the plane of action of the oblique muscles. He has concluded that in those individuals having mongoloid features (1) esotropia is often associated with underaction of the inferior oblique and the A phenomenon, while (2) exotropia is often associated with overaction of the inferior obliques and the V phenomenon. On the other hand, in individuals having antimongoloid features, the opposite is true, that is (1) esotropia is associated with overaction of the inferior obliques and V, while (2) exotropia is associated with underaction of the inferior obliques and A. He has made available to me an advanced copy of an anthropologic study supporting this thesis.

In an effort to compare our experience with his, we have, from our predominantly Caucasian (antimongoloid) practice, evaluated 103 cases of A and V. Contrary to his findings, we find an almost exactly equal number of A-esotropia (33) and V-esotropia (30), and again an almost equal number of A-exotropia (18) and V-exotropia (22). Thus, esotropia with A and exotropia with V do not predominate in our Causasian practice. We must admit, however, that the United States is inhabited by polyglot and hybrid peoples, and many may not demonstrate well marked antimongoloid features.

All of these latter thoughts to the contrary, it seems probable that anatomically determined defects of the orbits, the muscle origins and insertions, and of the muscles themselves as well as their fascia, may be important factors in the causation of the A and V phenomena.

I want to thank Professor Urrets-Zavalía for the privilege of discussing his paper, a discussion which has not done full justice to the excellent presentation he has made.

DR. URRETS-ZAVALÍA: There are several points on which I would like to cross swords with Dr. Costenbader, but at the outset I wish to pay my tribute to the lucidity and fairness of his crisp approach to the subject. I am left with the feeling that the most inexperienced student in this hall must have learned as much as I have this morning from the several arguments which have been advanced by him, and I have learned a great deal which will be of value to me.

It has been most stimulating to find that Dr. Costenbader agrees with me on so many points. As to his objection to the thought that in the Caucasian persons who have a vertical anomaly, esotropia is usually associated with the V phenomenon and exotropia usually associated with the A phenomenon, I must say that perhaps I have not made myself quite clear in this respect. The point is not that a patient should have the one or the other type of vertical disorder just because of his particular racial background. The point is, instead, that the fact that either the A or the V phenomenon be associated with esotropia or with exotropia depends upon the prevailing facial characteristics.

In the Caucasian races a malar hypoplasia and a downward slanting appearance of the palpebral fissures are, although common enough, by no means the rule; in fact, high cheek bones are often the patrimony of individuals of white northern European and of Slavic stock. Hence, it is no wonder that in the white patients studied by Dr. Costenbader there might have been approximately an equal number of A and V phenomena both in esotropia and in exotropia.

As a matter of fact, this is why in the anthropological studies which are at the basis of my formulation, certain races were chosen where an exaggerated development of the malar bones and an upward obliquity of the lid axes were constant features. It must be noted, besides, that the observations of Jampolsky and of Shekter seem to confirm the view that the A syndrome and the overaction of the superior obliques are generally more common in white exotropic patients than the opposite V phenomenon and the underaction of the same muscles.

ALLERGIC REACTIVITY OF IRIS EPITHELIUM IN VITRO AS DEMONSTRATED BY INTERFERENCE CINEMICROGRAPHY

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DEMONSTRATION of allergic reactivity in the immediate-type hypersensitivity states has been restricted in the past to *in vivo* systems (wheal and flare, Prausnitz-Küstner phenomenon, anaphylaxis, etc.) or to *in vitro* systems involving smooth muscle contractions (Schultz-Dale phenomenon). While these phenomena yield useful and informative facts in the study of allergy, they do not permit evaluation of the allergic reaction at a cellular level. The utilization of tissue culture and perfusion chamber time-lapse cinemicrography provides an excellent opportunity to study the response of individual cells from various tissues to a variety of stimuli and environmental conditions. Of special interest is the utilization of this method for the study of allergic reactivity as a dynamic function of individual cells.[2] Ocular tissues, particularly those of the uveal group, are frequently involved in pathologic processes postulated to be "immunogenic" or "allergic" in nature and, consequently, were selected for study in this investigation.

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MATERIALS AND METHODS

Experimental Animals

Mature guinea pigs (350 to 500 gm.) of both sexes obtained from a local com-

LEGENDS FOR COLOR PLATE

Selected frames from the time-lapse cinemicrographic records of the various experiments:

FIG. 1—A group D experiment (iris cells from a sensitized guinea pig with autologous serum) immediately prior to perfusion.

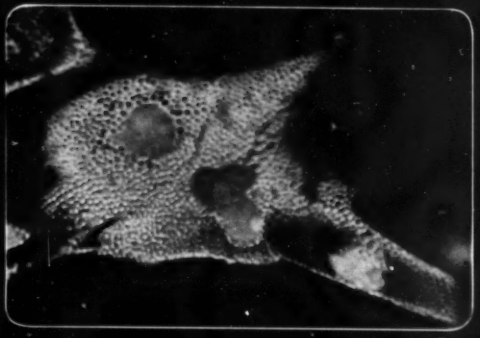
FIG. 2—The experiment shown in figure 1, 30 minutes after perfusion with the specific antigen. The cytoplasmic membranes have retracted and the cells have contracted markedly, indicative of a severe reaction.

FIG. 3—A group A experiment (iris cells from a normal guinea pig with autologous serum) immediately prior to perfusion.

FIG. 4—The experiment shown in figure 3, 30 minutes after perfusion with the antigen. The minor changes are due to normal movement during the elapsed time.

FIG. 5—A group E experiment (iris cells from a sensitized guinea pig with autologous serum) immediately prior to perfusion.

FIG. 6—The experiment shown in figure 5, 30 minutes after perfusion with histamine (10 micrograms per milliliter). The cytoplasmic processes have retracted and the cells have contracted similarly to those in figure 2.



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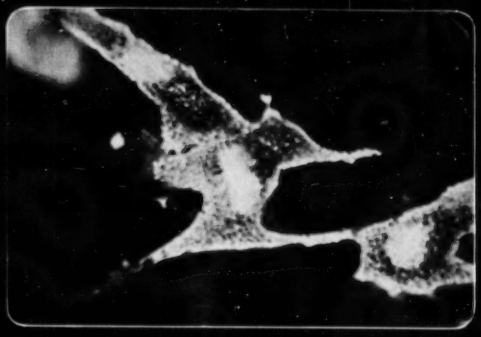

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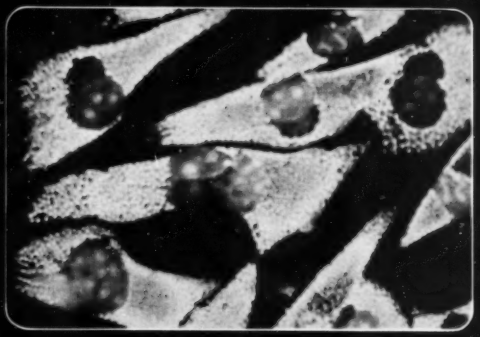

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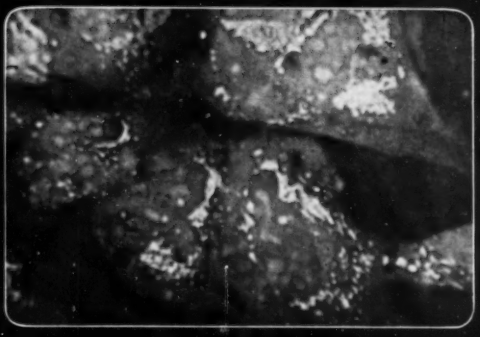

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6.

mercial breeder were divided into two groups. One group was sensitized by intraperitoneal injection of 0.5 milliliter of normal horse serum (Bacto-Horse Serum B261, Difco) diluted 1:10 with sterile isotonic saline solution. After an incubation period of fourteen days, two of the injected animals were challenged for anaphylactic sensitivity by intravenous injection of 0.2 milliliter normal horse serum diluted 1:10. Both animals succumbed to fatal anaphylactic shock within seven minutes of the intravenous injection. Individual guinea pigs of both the sensitized group and the normal group were exsanguinated by intracardial puncture, and the blood obtained was allowed to clot for the collection of serum. The eyes of the exsanguinated animals were immediately dissected and the irises excised for tissue culture. The excised iris tissue was dissected into fragments of approximately 1 square millimeter in area, which were then washed thoroughly in Eagle's medium. To prepare the tissue cultures, single fragments were transferred by capillary pipette to the center of circular (25 mm.) coverslips, one explant per coverslip. The explants were covered with heparinized cockerel plasma which was clotted by the addition of thrombin solution (100 units per milliliter bovine thrombin, Upjohn). Each coverslip with an explant was then inverted and placed within a perfusion chamber to form the top side of the chamber. These chambers consisted of two coverslips separated by a rubber gasket 2 mm. thick contained within a stainless steel holding device (Electro-Mechanical Development Company, cat. 1292). The intervening space between the two coverslips was filled with Eagle's medium containing 20 per cent guinea pig serum, 800 micrograms per milliliter of streptomycin and 1,000 units per milliliter of penicillin. The cultures prepared in this manner were incubated at 37° C. for four to five days to permit sufficient outgrowth from the original explant to enable individual cells to be photographed clearly.

Perfusion Experiments

Iris explants from normal and sensitized animals were cultured to provide five groups: Group A, normal tissue cultivated with autologous normal serum as a control on the toxicity of the antigen to be perfused (10 per cent horse serum in Eagle's medium); Group B, normal tissue cultivated with homologous serum from a sensitized guinea pig to determine the possibility of *in vitro* passive transfer of hypersensitivity; Group C, tissue from a sensitized animal cultivated with homologous serum from a normal guinea pig to determine whether unfixed antibody was necessary for the allergic reaction; Group D, tissue from a sensitized animal cultivated in autologous serum to mimic the *in vivo* relationship; Group E, tissue from a sensitized animal cultivated in autologous serum to determine *in vitro* reactivity to histamine.

After four to five days' incubation at 37° C., tissue cultures from all five groups were examined in perfusion chambers with the Baker-AO interference microscope employing a 40× shearing objective without an ocular. Cell activities were recorded on 16 mm. Kodachrome type A film by time-lapse cinemicrographic technique at a speed of eight frames per minute. Sufficient footage of film was exposed to allow a definitive evaluation of the normal cellular activities of each individual explant. With Groups A through D, the cultures were perfused with Eagle's medium containing 10 per cent horse serum for twelve minutes at a rate of 0.5 milliliter per minute by means of a peristaltic pump. In Group E, histamine (10 micrograms per milliliter) was substituted for the horse serum. In each instance, time-

lapse records were obtained of the perfusion and any subsequent reaction of the cells under observation. A film record of between 30 and 60 feet was obtained for each individual perfusion experiment and several perfusion experiments were performed within each experimental group (A-E) to establish the reproducibility and validity of the results being presented.

RESULTS

Group A: Normal Tissue with Normal Autologous Serum

Cells from the iris showed little change in activity or configuration when exposed to horse serum by perfusion (figs. 3 and 4). This observation indicates that the antigen under consideration is innocuous to normal iris cells in the absence of antibody specific for this antigen.

Group B: Normal Tissue with Homologous Serum from a Sensitized Guinea Pig

The introduction of horse serum by perfusion produced a definite effect on the iris cells. The undulating movements of the cellular ameboid extrusions were arrested with a retraction of the cytoplasmic processes. Intracellular activity was disturbed, with a marked reduction of granule movement. These effects were transient; most of the cells returned to normal morphology and activity within a few hours, but some cells failed to survive.

The marked effect upon the cells elicited by exposure to horse serum can be interpreted as a specific allergic reaction. In this instance, the iris cells were sensitized as a result of an *in vitro* passive transfer of antibody obtained from a previously sensitized guinea pig. Consequently, the antigen (horse serum) which proved to be innocuous to normal tissue in the absence of specific antibody now evoked an allergic response in the presence of specific antibody.

Group C: Tissue from a Sensitized Guinea Pig with Homologous Serum from a Normal Animal

Cells from the iris exhibited little change upon exposure to horse serum and behaved, essentially, in the same manner as the tissues in Group A.

The lack of reactivity of the iris cells from a sensitized animal cultivated in normal serum indicates that an adequate amount of free antibody in the nutrient fluid is essential to elicit an observable allergic reaction.

Group D: Tissue from a Sensitized Guinea Pig with Autologous ("Sensitized") Serum

Upon perfusion with horse serum, the iris cells exhibited a profound reaction. The cytoplasmic membranes were arrested in their activity and quickly retracted. All intracellular activity rapidly diminished and the cells tended to contract into a minimal space configuration indicative of marked toxicity (figs. 1 and 2). Resumption of cellular activity was slow and some cells failed to survive. This pattern of events can be interpreted as a specific allergic reaction on a cellular level.

Group E: Tissue from a Sensitized Guinea Pig with Autologous ("Sensitized") Serum

Perfusion with the histamine solution (10 micrograms per milliliter) evoked a marked reaction upon the iris cells (figs. 5 and 6). This reaction was comparable in intensity and duration to that observed with the tissues in Group B following perfusion with the specific antigen. Higher concentrations of histamine (50 micrograms and 100 micrograms per milliliter) produced dramatic contraction of the iris cells with cellular changes indicative of severe toxic damage. Consequently, the reactions elicited

by these higher concentrations could not be evaluated solely on the basis of physiologic reactivity.

DISCUSSION

In the immediate-type hypersensitive states, the so-called "shock organs" (smooth muscle and vascular endothelium) have been considered to be the major tissues involved in the allergic reaction. This concept has persisted primarily because the overt symptomatology associated with anaphylactic or atopic allergic reactions can be attributed to increased vascular permeability (edema, urticaria, wheal and flare, etc.) or smooth muscle contraction (bronchospasm, Schultz-Dale reactions, increased intestinal peristalsis, etc.). In addition, one of the classic criteria in the differentiation between immediate and delayed (tuberculin-type) hypersensitivities has been evidence of cytotoxic reactivity in tissue culture of tissues from animals possessing delayed-type hypersensitivity. This type of cytotoxicity produces eventual necrosis of the explanted cells and requires several hours before the effect becomes evident.[1,3] In contrast, with cells other than smooth muscle and vascular endothelium from animals in which the immediate-type allergy has been induced, the effect is rapid and transient and becomes evident only by means of time-lapse cinemicrography. This rapid and transient effect has long been established in the case of excised smooth muscle, as witness the widespread use of the Schultz-Dale technique. Histamine is frequently employed as a control for reactivity in the Schultz-Dale technique, and in proper concentration it elicits contractions comparable to those produced by specific antigen-antibody combinations.

In this series of experiments with iris tissue, evidence is presented that tissues remote from smooth muscle and vascular endothelium are capable of reacting specifically upon exposure to antigen-antibody systems and that these reactions are comparable to those elicited by exposure to suitable concentrations of histamine. These reactions, which can be postulated to be allergic in nature, are transient and of relatively short duration. Consequently, this phenomenon generally has been overlooked in the past in the absence of perfusion chamber time-lapse cinemicrography.

SUMMARY

Explants of iris tissue, excised from guinea pigs anaphylactically sensitized to horse serum, reacted profoundly upon exposure by perfusion to horse serum. The ability of these tissues to react to the antigen was found to be dependent upon the presence within the tissue culture of serum from sensitized guinea pigs. Iris explants from sensitized animals cultivated with normal serum failed to react, while normal tissue cultivated with serum from sensitized guinea pigs reacted as though passive transfer of the hypersensitivity had occurred *in vitro*. Perfusion of explants with histamine solutions elicited reactions comparable to those obtained by perfusion of the specific antigen. All reactions were transient and became readily apparent only by analysis of cinemicrographic records.

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PERCUTANEOUS RENAL BIOPSY AND OCULAR VASCULAR DISEASE

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BY INVITATION

CHICAGO, ILLINOIS

PERCUTANEOUS renal biopsy is an extensively documented and well established research procedure but is only gradually becoming accepted as an ordinary diagnostic method. During the past several years some 450 such biopsies have been performed at the University of Chicago Clinic. Many of the patients studied have had extensive ocular examinations, and it is the purpose of this report to discuss the value of percutaneous renal biopsy in relation to obscure ocular vascular disease.

Percutaneous renal biopsy permits the correlation of clinical signs and symptoms and the data obtained from laboratory tests with the morphologic changes in the kidney before the onset of noncharacteristic end-stage scarring. The procedure also permits the study of tissue with the electron microscope, an instrument which is becoming increasingly important in the resolution of some of the problems of renal disease.

The usual renal biopsy produces from five to thirty glomeruli. This may be adequate to give a useful and even spectacular diagnosis, but it may also contribute nothing of clinical value. In part, this is due to a lack of depth of general experience in interpreting renal biopsy material and a lack of agreement between classical pathologic and clinical entities. Almost every group which has had extensive experience with renal biopsies has had early difficulty in specifically characterizing obviously pathologic changes and relating them to current disease concepts. Some of this difficulty is resolved with experience, but some of it is apparently due to lack of recognized standards concerning the early stages of disease, which were heretofore seen only at the autopsy table, and usually after noncharacteristic end-stage scarring had occurred.

Arnold and Spargo[1] state that some problems are insurmountable and no clear way of overcoming them is now apparent. If the lesions are focal and scattered, they will be discovered only by chance. The lesions of Kimmelstiel and Wilson disease and scleroderma, for example, are often so focal that a very large specimen would be needed to ensure inclusion of a diagnostic lesion. Others, such as glomerulonephritis with a more uniform diffuse involvement will be discovered if a reasonably good sample is obtained. Obviously, a focal type of lesion cannot be followed by serial biopsies and this limits the value of the procedure.

From the Departments of Surgery (Ophthalmology), Medicine and Pathology of the University of Chicago. Supported in part by a grant from the Douglas Smith Foundation and the L. B. and E. M. Kuppenheimer Research Fund.

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The value of percutaneous renal biopsy in providing material for electron microscopy deserves emphasis. Because of autolytic changes occurring within seconds after death, the postmortem kidney does not lend itself to electron microscopic pictures. The recent correlation of light microscopic and electron microscopic studies on the same sections has permitted the accumulation of information not available any other way.

Vernier[6] states that prudent use of percutaneous renal biopsy would require that the patient have two kidneys, that abnormalities of the clotting mechanism or bleeding diatheses be ruled out by appropriate studies, and that its use in malignant hypertension be carefully evaluated. Minimal studies required are bleeding and clotting time, prothrombin time, platelet count, and the determination of the blood urea nitrogen. Routinely, a flat plate of the abdomen or an intravenous pyelogram is obtained for localization of the kidney in respect to bony landmarks.

It is sound practice to carry out the procedure in the hospital and to keep the patient under observation at bed rest for 48 hours subsequent to biopsy. Attention is directed particularly to the careful check on blood pressure, urinalysis, and the postoperative palpation of the abdomen in this period.

Prior to biopsy the patient is usually sedated with a barbiturate and Demerol in the dosages ordinarily indicated for local surgical procedures. The patient is placed in a prone position with his abdomen on a sandbag. This position seems to immobilize the kidney partially. The kidney is oriented in respect to the lumbar vertebra and costal margin, based on the roentgenographic position of the kidney. The area to be penetrated is infiltrated with 1 per cent procaine hydrochloride. A no. 22 needle is used as an exploratory needle to localize the lower pole. The position of the needle in the kidney may be confirmed by the characteristic respiratory excursions of the needle. Once the kidney has been reached, the spinal needle is replaced by a Vim-Silverman needle, which is passed along the same tract and to the same depth as the exploratory needle. The tissue is removed then with a small forceps. The specimen is usually divided into two portions. One half is studied with the usual tissue stains and the other by means of electron microscopy.

The procedure carries with it certain risks. Hemorrhage in some degree probably occurs after every biopsy. In most cases the only evidence of bleeding from the biopsy site is the appearance of blood in the urine. Hematuria is usually microscopic in amount and persists no longer than 36 hours. In near terminal cases in which biopsy has been carried out and the site studied post mortem, there is evidence of blood loss ranging from 10 to 50 milliliters. The local tissue forces in the region of the posterior aspect of the kidney seem quite capable of tamponade and control for this amount of bleeding.

Penetration of the pelvis of the kidney and reflux of urine through the biopsy needle has been known to occur. This mishap may also be discovered by the recovery of mucosal tissue in the biopsy specimen. Although this would seem to be a serious event, it is usually uncomplicated unless the urinary tract is obstructed. Penetration of the hilar vessels by the percutaneous needle is potentially serious, particularly if the renal vein is involved. Such a hemorrhage may on occasion require operative intervention for control. However, severe hemorrhage requiring either transfusion or surgical intervention occurs less frequently than once in a hundred biopsy

attempts. Many of these hemorrhages are self-limited and require only transfusion of whole blood for control. Hemorrhage is much more common in cases of malignant hypertension, uremia, primary bleeding dyscrasias, obstructive uropathies and polycystic disease.

Immediate or delayed pain occurs in a small number of patients. The pain may be either colicky or constant or localized in the flank. It is rarely severe. Death from the procedure is extremely uncommon; according to Arnold and Spargo,[1] the incidence in experienced hands is less than 0.1 per cent. However, the natural reluctance to report this tragedy has probably suppressed some reports of such experience from the literature. In some of the deaths that have been reported, the actual mechanism of death was unknown. Some may be unrelated to the biopsy procedure, but the known causes—hemorrhage and shock—are of first importance.

Neither the age nor the size of the patient seems to limit the procedure. Vernier[6] has carried out over 250 kidney biopsies in children more than 2 years old, with a morbidity of 2 per cent and no mortality. At the University of Chicago Clinics the procedure has been carried out at every age from one year into the seventh decade. One patient weighing 450 pounds has been biopsied successfully. Anasarca does not increase the risk of percutaneous biopsy, and infections in and around the kidney are apparently not complicated by the procedure.

The renal indications for percutaneous renal biopsy vary widely. Generally, unless the patient is in uremia or in the nephrotic syndrome, the primary renal diseases are remarkably asymptomatic. The procedure is of practical value as a guide to therapy and as an indicator of prognosis in the nephrotic syndrome. A list of the diseases producing the nephrotic syndrome should include lipid nephrosis, chronic glomerulonephritis, systemic lupus erythematosus, diabetes mellitus, polyarteritis nodosa, renal vein thrombosis, and amyloid disease. Certain drugs and toxins are known to produce this syndrome also. In disseminated lupus erythematosus, renal biopsy may permit a diagnosis in patients in whom typical cells are not present in either clot or bone marrow studies. Renal biopsy may make possible the diagnosis of amyloid disease, which presently is only suggested by laboratory findings.

In diabetes mellitus, renal biopsy is of considerable value in indicating renal involvement very early in the course of the disease. Study of certain patients has suggested that the renal disease in diabetes mellitus may have its onset prior to the development of overt disease.

Renal biopsy is indicated in a variety of vascular abnormalities involving the eye, but only after comprehensive clinical and laboratory studies have failed to establish the diagnosis. It is indicated in bilateral central vein closure, or impending closure, in which the etiologic factor is not evident. It is particularly valuable in patients in whom arteriosclerotic changes in the arterial tree are not prominent and in whom it is believed that the venous closure does not represent an extension of similar process in the adjacent central retinal artery. In patients with retinal neovascularization of unknown origin in which the laboratory tests have failed to indicate the disease, percutaneous renal biopsy may be of value. In occlusive vascular disease arising from lupus erythematosus or other collagen diseases, renal biopsy may indicate the diagnosis. Electron microscopy of material obtained by renal biopsy may permit distinction between pure eclampsia and other conditions characterized by similar clinical and laboratory findings. In patients with retinal

hemorrhages and microaneurysms in which the ordinary clinical tests do not indicate diabetes mellitus, percutaneous renal biopsy may clarify the diagnosis.

DIABETES MELLITUS

The concept of nephropathy and retinopathy as being due to a long-standing, poorly controlled diabetes mellitus is undergoing evaluation. For a long time it was believed that the initial feature of the disease was a disturbance of the carbohydrate metabolism of the patient. However, renal biopsy indicates that in some patients specific pathologic changes in the kidney may precede an overt hyperglycemia or abnormal glucose tolerance test. Moreover, in some such patients there may be retinal hemorrhages and what appear to be microaneurysms without overt diabetes mellitus.

The Kimmelstiel and Wilson nodular lesion of the kidney is considered nearly pathognomonic of diabetes mellitus but a fairly well advanced lesion is required for clear identification by light microscopy. Earlier and less extensive changes can be identified with the use of the electron microscope. An intracytoplasmic change in the endothelial cell affecting the basement membrane appears to be characteristic of the early Kimmelstiel and Wilson lesion.

The vascular changes in the kidney seen in biopsy specimens cannot be distinguished from those due to aging or hypertension. Hyalinization of the efferent arteriole is a characteristic often useful in large sections but is much less useful with the biopsy specimen.

Other pathologic changes in the kidneys, such as the diffuse membranous lesion of Bell, the hyalin acellular fibrinoid lesion of Koss, and the tubular changes described by Kimmelstiel recently, are of unknown specificity for diabetes mellitus. The problem is further complicated by certain patients with diabetes mellitus who have renal damage demonstrable with renal biopsy but who do not have abnormal urinary sediment.

Arnold, Tarlov, Spargo and Brewer[2] reported 40 patients with protein and birefringent fat in the urine clinically diagnosed as chronic glomerulonephritis. No patient had glycosuria. However, 46 per cent of the patients with nephritis had a blood sugar content of over 140 milligrams per 100 cubic centimeters two hours after a standard test meal, compared to 22 per cent of the presumed normal group. Five of these patients with abnormal glucose tolerance studied by one of us (B.A.K.) had isolated microaneurysms of the fundi. Usually these were isolated and by no means characteristic of diabetes mellitus. Only their persistence and unchanging appearance indicated that they were microaneurysms and not small hemorrhages. One patient with an apparently normal glucose tolerance test had microaneurysms.

Of the 40 patients considered, two had the nodular lesion of Kimmelstiel and Wilson and subsequently developed overt diabetes. Five patients had a diffuse membranous lesion, one lesion was clearly diabetic and the other four were unclassified. Twelve patients had changes of nephrosclerosis.

TOXEMIAS OF PREGNANCY

For many years it has been the custom at the University of Chicago Clinics to study ophthalmoscopically all patients admitted with a diagnosis of eclampsia. Clinically, however, it is not always possible to distinguish between eclampsia and pre-existing renal vascular disease in patients in the last trimester of pregnancy with edema, proteinuria and hypertension. Light microscopy of percutaneous renal biopsy material has not

been helpful in this problem. Spargo, McCartney and Winemiller,[5] however, have reported distinctive glomerular capillary endothelial cell change involving the cytoplasm. This is characteristic of the condition and is markedly demonstrable with electron microscopy. The lesion is unique in that it has not been found to this degree in normal pregnant or nonpregnant women.

RETINAL VEIN CLOSURE

Three patients have been seen with actual or impending bilateral central vein occlusion. Biopsy of material indicated a diagnosis of renal thrombophlebitis.

Attention was directed to the association between venous ocular and renal disease by the findings in a white male, aged 56 years, who was first seen June 14, 1957. A right central vein closure was present and an impending central vein closure was diagnosed in the left eye. A twin brother was described as "nearly blind" with a similar disease. Ophthalmoscopic examination indicated that the right disc was hyperemic with newly formed blood vessels over its surface. The retinal veins were congested and there were nets of new-formed blood vessels especially conspicuous at the posterior pole. There was no arteriole organic lesion.

The left venous tree was dilated, and there were nets of neovascularization on the inner retinal surface with some superficial hemorrhages near the disc. It was believed that the marked venous engorgement and formation of new blood vessels were suggestive of primary venous disease, with a relative retinal anoxia of long duration.

Extensive laboratory tests, including cortisone-provocative glucose tolerance tests, muscle biopsy, lupus erythematosus cell preparations, blood cytological and chemical studies and skin tests, were not helpful diagnostically.

Renal biopsy indicated focal areas of glomerular veins obliterated by old thrombotic material, with rechannelization. A diagnosis of moderate nephrosclerosis with prominent phlebosclerosis was made.

Since 1957 two more patients with central vein closure have been studied with similar renal findings. The significance is not yet known. It must be pointed out that renal biopsy has been limited only to patients with binocular disease which appeared to be primarily venous and not an extension of an arterial process.

RETINAL NEOVASCULARIZATION

A number of patients have been seen with retinal neovascularization of unknown origin and a nephrosclerosis of varying severity but always disproportionately severe to the amount of systemic disease demonstrable. The majority of these patients are seen because of one or more vitreous hemorrhages, and examination indicates a neovascularization near the equator with sheets of vessels extending into the vitreous. Extensive testing and study fail to indicate an etiologic factor for the formation of new blood vessels. Renal biopsy material frequently indicates a nephrosclerotic intimal hyalinization of the small arterioles extending into the glomeruli.

The significance of these findings and the question of whether the renal and ocular lesions are related is unsettled. The patients do not have vascular hypertension. The focal nature of the vascular involvement makes biopsy evaluation difficult and these patients must be studied for a longer period before the nature of their disease is evident.

LUPUS ERYTHEMATOSUS

The onset of lupus erythematosus in many patients may be so insidious or the symptom complex so unusual that the diagnosis cannot be made immediately. In such patients there may be the development of retinal hemorrhages and deposits suggestive of arteriole occlusive disease, with no other systemic evidence of collagen disease. The natural history of systemic lupus is undoubtedly much longer than it was once thought to be, and it is quite possible that the first noticeable symptom of the disease may be a nephritis of obscure cause, or, in fact, there may be only obscure symptoms with few findings in the urine. In either case, with or without an abnormal urine, a diagnostic anatomic change may exist in the kidney. Lupus nephritis, unlike many of the other nephropathies, does not produce a urinary sediment that is easily correlated with the degree of activity in the kidney tissue itself. When wire-loops are clearly identified, there is generally little difficulty in making a diagnosis. Unfortunately, glomerular changes such as proliferation of the endothelial and epithelial cells, generalized thickening of the basement membrane, hyaline thrombi, focal necrosis, fibroepithelial crescents, fibrinoid changes, and so on, all of which are not clearly pathognomonic of systemic lupus, may be all that is discovered on renal biopsy; the diagnosis may remain in doubt despite a fairly large biopsy specimen.

SUMMARY

Percutaneous renal biopsy has been carried out on 450 patients at the University of Chicago Clinics during the past five years. With proper precautions the procedure may be carried out in selected patients with a minimum morbidity and mortality. The procedure has been of value in the following ocular conditions:

1. In certain patients with microaneurysms and hemorrhages suggestive of those occurring in cases of diabetes mellitus, and in those in whom a carbohydrate defect cannot be demonstrated biopsy of renal material has indicated characteristic changes of diabetic nephropathy.

2. In three patients with impending bilateral central vein occlusion, biopsy of renal material has indicated a renal thrombophlebitis.

3. Pre-eclampsia and eclampsia with abnormalities of the ocular fundi may be distinguished from other renal diseases causing vascular hypertension, proteinuria and edema by a characteristic reversible change, demonstrable by electron microscopy of kidney tissue.

4. In systemic diseases characterized by retinal occlusive arteriolar changes, percutaneous renal biopsy may show characteristic renal changes, particularly in lupus erythematosus.

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DISCUSSION

LORENZ E. ZIMMMERMAN, M.D., Washington, D. C.: Dr. Newell and Dr. Klien and their associates in medicine and pathology at the University of Chicago have begun a most worthwhile project which will require much more time and effort on their part and more detailed clinicopathologic reports before we are in a position to evaluate the practical significance of percutaneous renal biopsy as an aid to the ophthalmologist.

I am quite certain that you clinicians appreciate much more than I the need for better adjuncts in clinical diagnosis. I suppose you often wish you had some magic tool that would give you the correct answers to some of the difficult questions that come up in the course of ophthalmoscopic examinations. Dr. Newell and his associates have made no claim that renal biopsy is such a final answer-producing device. They have quite properly emphasized the need for further studies to correlate ocular and renal disesases.

In my Jackson Memorial Lecture I made a plea for your assistance in obtaining more autopsy material.

Dr. Newell and his co-workers are going even further. They are making extensive clinical studies of the medical and ophthalmologic status of their patients, correlating these clinical data with anatomical alterations observed in serial biopsy specimens obtained from the kidneys. When these well-studied patients die, I am sure Dr. Newell's group will make every effort possible to obtain complete autopsies, including examination of the eyes. Eventually this farsighted program will pay off, I am sure.

In the meantime, I would like to caution anyone who might have gained the false impression that renal biopsy is a technique readily available to all physicians. I personally believe that renal biopsy should be used only in certain institutions where the team approach is feasible.

Speaking now from the viewpoint of a pathologist, I would emphasize that sending a kidney biopsy specimen to the laboratory is not like most other biopsy procedures. This is a relatively new and highly specialized field of pathologic anatomy, one which requires much experience and a prolonged opportunity to correlate the clinical features of renal diseases with the histologic changes before the pathologist can be expected to provide an intelligent appraisal that will aid the clinician.

There are also important technical problems. Ideally, every biopsy specimen should be handled in exactly the same manner. Fixation must be prompt and controlled. The same microtome, operated by the same technician, should be used in every case. The sections should be very thin, preferably less than 3 microns in thickness. Several staining procedures should be employed in a uniform fashion.

It is important to realize that merely varying the thickness of the sections and varying the staining techniques employed may lead to serious errors in interpretation.

My associates at the Armed Forces Institute of Pathology, who have been studying renal biopsy specimens contributed from hospitals all over the country, have been in an especially good position to appreciate the importance of controlling histologic technique. They have had the good fortune of being able to study the excellent material provided by Dr. George Schreiner's group at Georgetown University. In the experience of Dr. Schreiner and his colleagues, renal biopsy has become a most important adjunct to clinical investigation. Unfortunately as McManus and Lupton have recently pointed out (Lab. Invest., 9:413-434, 1960), the technical considerations seriously limit the usefulness of random sections that have been cut in other laboratories.

I would like to ask some questions regarding the practical application of this method to the study of patients with vein thromboses.

In discussing with Dr. Klien, the fine exhibit prepared by these investigators, I gained the impression that occasionally renal biopsy has provided some information which was useful in clinical management, indicating whether you should treat the patient with cortisone or anticoagulants. Would Dr. Newell care to discuss this practical aspect?

Also, in this group of patients who show inflammatory changes with venous occlusions, I wonder whether the possibility of Buerger's disease might have been considered and whether muscle biopsies were performed.

In closing, I think we should look forward to further reports from this excellent team providing us with important data as their work and experience progress.

DR. NEWELL: Renal biopsy has not been particularly valuable from an ocular therapeutic viewpoint. It has permitted us to anticipate the development of diabetes mellitus in certain patients. In two patients with arteriolar obliterative disease of the fundus, a diagnosis of systemic lupus was made.

I confirm what Dr. Zimmerman has already suggested, namely that we must have considerably wider experience and correlation in a variety of ocular diseases before we get the maximum value from this material.

TRANSACTIONS

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ARMED FORCES INSTITUTE OF PATHOLOGY

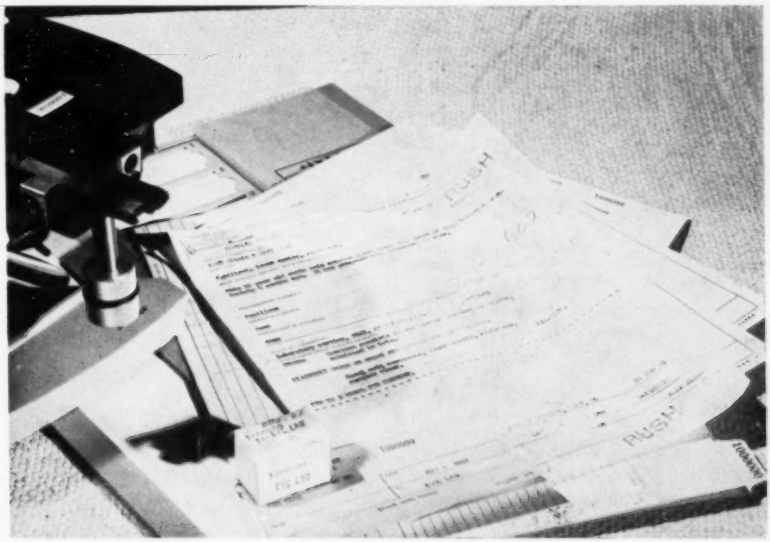

FIG. 1—Pictured above is the 1,000,000th accessioned case received by the Armed Forces Institute of Pathology, Washington, D. C. It is a biopsy specimen of a tumor removed from the right eyelid of an Army Officer.

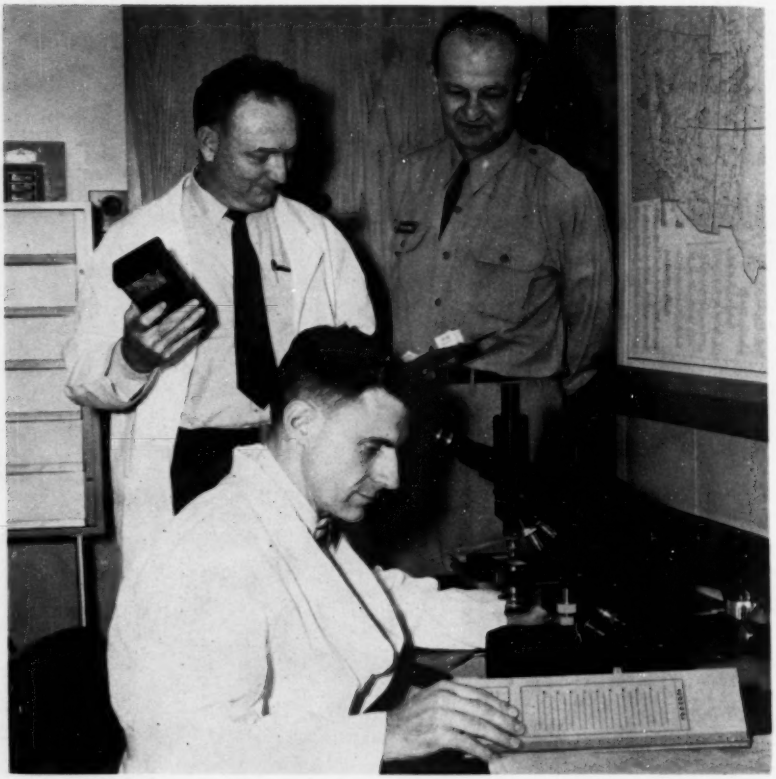

FIG. 2—Seated, Lorenz E. Zimmerman, M.D., Chief, Ophthalmic Pathology Branch; standing left, Colonel Frank M. Townsend, USAF, MC, Director of the Institute; and Major Charles B. Broadway, USAF, MSC, Chief, Professional Records Branch, review the 1,000,000th Accessioned case of the Armed Forces Institute of Pathology.

THE one millionth medical case contributed to the Armed Forces Institute of Pathology in Washington, D. C., was received and accessioned on May 8, 1961. This historic event occurred during the final year of the Institute's first century of existence. Founded as the Army Medical Museum during the Civil War (May 21, 1862), the Institute has grown to become the central laboratory of pathology for the Armed Forces, Veterans Administration, FBI, Civil Aeronautics Board and Federal Aviation Agency, Atomic Energy Commission, and other governmental agencies.

A threefold mission of consultation, education and research in pathology is carried on by the AFIP. Today, the Institute receives approximately 70,000 autopsy and surgical cases annually from these combined sources.

It is of historical interest that AFIP case no. 1,000,000 was a biopsy specimen of a tumor removed from the right eyelid of an Army Officer, since the Institute has played such an important role in development of eye pathology in the United States. The Institute's Registry of Eye Pathology, containing over 50,000 specimens, is the largest single collection of Ophthalmic Pathology cases available for teaching and research anywhere in the world. This Registry, sponsored by the American Academy of Ophthalmology and Otolaryngology in 1921, paved the way for the subsequent establishment of other Registries, and organization of the American Registry of Pathology under the guidance of a special committee of the National Research Council in 1930. Of further interest historically is the fact that the first surgical specimen received at the Army Medical Museum in 1917, when the current series of "Accession Numbers" was begun (AFIP Acc. no. 6), was an eye, enucleated because of a malignant tumor, in the case of a 3-year-old girl.

HOME STUDY COURSES

Application forms for the 1961-1962 Home Study Courses in Ophthalmology and Otolaryngology are now available. They may be secured from Dr. William L. Benedict, Executive Secretary-Treasurer of the Academy, 15 Second Street S.W., Rochester, Minnesota.

The Courses begin on September first each year and cover a period of ten months. Enrollments should be completed before August 15. The fee is $20.00.

In Memoriam

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December 3, 1960

John Sheldon Clark.....Freeport, Illinois
December 11, 1960

Charles Wentworth DeWolf.....Melrose, Massachusetts
December 12, 1960

Arthur Ernest Doull.....Halifax, N. S., Canada

Ralph Graves Ferris.....Birmingham, Michigan
January 29, 1961

Samuel T. Glasford.....Pekin, Illinois
September 17, 1960

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January 13, 1961

John Arthur Kerst.....Springfield, Illinois
March 10, 1961

Thomas Viggers Murto.....Trenton, New Jersey
December 25, 1960

Henry Patrick Wagener.....Rochester, Minnesota
April 27, 1961

Robert Francis Welch.....Brockton, Massachusetts
December 12, 1960

Samuel Henry Wilkins.....Boston, Massachusetts
February 2, 1961

SECTION ON INSTRUCTION

SIXTY-SIXTH ANNUAL MEETING

American Academy of Ophthalmology and Otolaryngology

October 8-13, 1961

PALMER HOUSE

Chicago, Illinois

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An *individual* course is complete in one (1) period. A *continuous* course runs two (2) or more periods as indicated. It is not possible to purchase a ticket to only *part* of a continuous course. Some courses are repeated on different days allowing the subscriber to choose the time when he wishes to attend.

Ordering Instruction Tickets

Only members who have paid their 1961 dues may order instruction tickets in advance of the meeting. **Members should order tickets only for their own use.** *Candidates for fellowship in the Academy are not privileged to reserve tickets in advance.* After the session opens, no distinction between members, candidates and guests will be made in selling tickets.

At the end of this section is printed a colored sheet to be used when ordering tickets in advance. Specify preferences on this sheet and mail to the executive office. Careful attention to instructions will ensure the correct filling of your requests. *Since number of tickets for each course is limited, be sure to list second and third choices for each period in case first choice is already sold out. In every case, effort will be made to furnish first choices.*

If you are requesting registration in the continuous courses, please specify preferences for individual courses as substitutes in order to avoid disappointment should the continuous courses which you select be sold out when your order is received.

Each period (1 hour) of instruction costs $2.00. *Orders not accompanied by properly executed checks will not be filled.* Checks should be made payable to W. L. Benedict, M.D., and mailed to the Academy office, 15 Second St. S.W., Rochester, Minn.

All orders for tickets will be filled according to the postmark on the envelope containing the check. Telegrams will not be honored. Orders will not be accepted for presale after September 28; to ensure acceptance they should be mailed before September 26.

Acknowledgment of Advance Order

As soon as an advance order is filled, a post card, listing the courses that have been reserved for him, will be mailed to the subscriber. Please do not ask to change courses after your order has been filled. The post card is merely an assurance that your order has been filled; it is not necessary for registration at the Academy meeting.

Claiming Instruction Tickets

No tickets will be sent through the mails. Members who have ordered instruction course tickets will register at the *Advance Order Section* of the Registration Desk during the week of the Convention to secure registration badge, tickets, and all convention material.

Tickets will be on sale during the meeting at the Instruction Desk on the Club Floor and the Seventh Floor.

Refunds

If courses requested are not available and it is impossible to substitute, a refund will be granted. A blue refund card will be placed in the Advance Registration Envelope which is received at the time of registration. This may be presented at the Instruction Desk for payment.

In case of inability to attend the meeting after order has been filled, a refund will be granted if requested prior to October 2.

If you have ordered tickets in advance, at the time of registration take your registration card to the desk marked ADVANCE ORDERS. There you will be given an envelope containing badge, tickets and program which has been prepared ahead of time to facilitate your registration.

KEY TO DESIGNATION OF PERIODS

The periods will be designated with the following key: Select tickets for — Otolaryngology, forenoons, periods 1-2-3 — Ophthalmology, afternoons, periods 4-5-6

Day	(M)onday	(T)uesday	(W)ednesday	(Th)ursday
Period a.m.		1 2 3	1 2 3	1 2 3
Period p.m.	4 5 6	4 5 6	4 5 6	4 5 6

M-4	2:00 p.m. to 3:00 p.m.	W-4	2:00 p.m. to 3:00 p.m.
M-5	3:15 p.m. to 4:15 p.m.	W-5	3:15 p.m. to 4:15 p.m.
M-6	4:30 p.m. to 5:30 p.m.	W-6	4:30 p.m. to 5:30 p.m.
T-1	9:00 a.m. to 10:00 a.m.	Th-1	9:00 a.m. to 10:00 a.m.
T-2	10:15 a.m. to 11:15 a.m.	Th-2	10:15 a.m. to 11:15 a.m.
T-3	11:30 a.m. to 12:30 p.m.	Th-3	11:30 a.m. to 12:30 p.m.
T-4	2:00 p.m. to 3:00 p.m.	Th-4	2:00 p.m. to 3:00 p.m.
T-5	3:15 p.m. to 4:15 p.m.	Th-5	3:15 p.m. to 4:15 p.m.
T-6	4:30 p.m. to 5:30 p.m.	Th-6	4:30 p.m. to 5:30 p.m.
W-1	9:00 a.m. to 10:00 a.m.		
W-2	10:15 a.m. to 11:15 a.m.		
W-3	11:30 a.m. to 12:30 p.m.		

(Familiarity with this key will be helpful and will avoid confusion)

1961

CONTINUOUS COURSES — OPHTHALMOLOGY

COURSE 1

Room 738 — Periods M-4, M-5, T-4, T-5, W-4, W-5, Th-4, Th-5

JAMES H. ALLEN, M.D., et al

Bacteriology and Infectious Diseases of the Eye

An eight-period course—$16.00

The first hour of the course will be devoted to bacteriology and methods of etiologic diagnosis of infectious diseases. Six hours will be devoted to the clinical manifestations and differential diagnosis of infectious and allergic diseases of the eye, and one hour will be devoted to a general summary of the therapy of infectious diseases.

M-4—Bacteriology
Ted Suie, Ph.D.
Columbus, Ohio

M-5—Lids and Lacrimal Apparatus
Alson E. Braley, M.D.
Iowa City

T-4—Conjunctival Infections
Isadore Givner, M.D.
New York

T-5—Allergic Diseases
Frederick H. Theodore, M.D.
New York

W-4—Corneal Infections
Henry F. Allen, M.D.
Boston

W-5—Virus Diseases of the Lids and Conjunctiva
Samuel J. Kimura, M.D.
Berkeley, Calif.

Th-4—Infections of the Orbit and Conjunctiva
Gustav C. Bahn, M.D.
New Orleans

Th-5—Principles of Therapy
James H. Allen, M.D.
New Orleans

COURSE 2

Room 713 — Periods M-4, M-5

KARL W. ASCHER, M.D.
Cincinnati

Aqueous Veins in Glaucoma

A two-period course—$4.00

The aqueous veins are biomicroscopically visible pathways similar to blood vessels in appearance. They contain clear, colorless fluid or diluted blood or both, and are intercalated, via Schlemm's canal, between intraocular fluid and conjunctival or episcleral veins.

The detection, in 1941, of the aqueous veins confirmed the presence of a continuous elimination — and therefore production — of aqueous humor, resolving a controversy of decades and opening new approaches to glaucoma research. The physiologic implications of these structures have been verified by numerous investigators in studies on man and on animals. The control of flow appears to reside within the roots of the aqueous veins, deep in the scleral tissue, with a regulating center which is probably located in the diencephalohypophyseal area. The trabecular meshwork also plays a role and may contain baroceptors.

The qualities of the aqueous veins and their bearing on the retention theory and the neurovascular theory of glaucoma will be discussed. A motion picture will be shown.

COURSE 3

Room 706 — Periods W-5, W-6

ELMER J. BALLINTINE, M.D.
Cleveland
and
E. PURNELL, M.D.
Euclid, Ohio
BY INVITATION

Clinical Tonography

A two-period course—$4.00

The value of tonography as a practical clinical office procedure in the management

of glaucoma has been established. The clinical procedure and the more common sources of errors will be demonstrated in a motion picture and discussed in sufficient detail that the observers will be able to perform the test or instruct their technicians in the procedure.

Most of the time will be spent in interpretation and discussion of tonographic data obtained in the following clinical situations:

1. Early diagnosis of glaucoma
2. Refinement of provocative tests
3. Anticipation of failure of medical therapy before field loss occurs
4. Anticipation of failure of previously successful antiglaucoma surgery
5. "Low-tension glaucoma" as a result of
   (a) decreased scleral rigidity
   (b) "arrested" glaucoma
   (c) cavernous atrophy of the nerve and related concepts

COURSE 4

Room 713 Periods T-4, T-5

BERNARD BECKER, M.D.
St. Louis

V. EVERETT KINSEY, Ph.D.
Detroit

Studies of Aqueous Flow

A two-period course—$4.00

Current concepts of the composition of the aqueous humor and the manner of its formation will be presented.

The rate of aqueous secretion will be discussed from the point of view of methods of measurement and induced alterations.

COURSE 5

Room 734 Periods M-4, T-4, W-4

ARTHUR J. BEDELL, M.D.
Albany, N. Y.

Ophthalmoscopy

A three-period course—$6.00

Kodachrome demonstrations with hundreds of photographs in a comprehensive review.

Normal variations, anomalies and unique patterns.

Circulatory alterations including sudden arterial or venous occlusions with serial studies. The retinopathy found in diabetes, the hypertensive state, and arteriosclerosis. The blood dyscrasias, tuberculosis and syphilis.

The optic nerve diseases; emphasis on the differentiation between edema, choked disc, infection, and optic neuritis.

Senile macular degeneration from the earliest signs to terminal scars.

COURSE 6

Room 722 Periods M-6, T-6, W-6

MILTON L. BERLINER, M.D.
New York

Recent Advances in Biomicroscopy

A three-period course—$6.00

This course is designed to draw attention to the recent advances in biomicroscopy as related to the examination of the vitreous and fundus. Biomicroscopy, in spite of certain limitations, is still the only satisfactory way in which normal and pathologic features in the vitreous can be visualized. Improvements in the apparatus itself, such as that making it possible to narrow the angle between illumination and observation from 0 to 90 degrees; great increase in the intensity of illumination, thus providing a more adequate Tyndall; the ease of application of supplementary devices permitting focusing in the deeper areas such as the preset lenses (Hruby negative lens and the Bayardi plus lens, and especially the new Goldmann contact lenses) will be described. A comparison of the advantages and disadvantages of all these devices will be discussed. Many new concepts of the normal vitreous structure systems, only visible biomicroscopically, already appear to be supported by histologic confirmation. The alterations in age and myopia (liquefaction, cavity formation and detachments of both the anterior and posterior vitreous faces) are coming into clearer focus. Extension of these changes in pathologic conditions resulting in shrinkage and pseudomembranes

such as are seen in retinal detachment and injuries, will be discussed. The significance of hemorrhage and cellular infiltrates will be emphasized.

The importance of the optic section and indirect (lateral) illumination in the study of fundal lesions cannot be overemphasized. This permits the study of surface irregularities—changes in retinal thickness; differentiation between cysts and tears — the localization and differentiation between retinal and choroidal lesions, etc. The three-mirror contact lens permits observation of the fundal periphery. This is a great adjunct to indirect ophthalmoscopy. With the new tilting device, horizontal beam and the three-mirror contact lens, observation in the lateral areas of the peripheral fundus is now possible.

COURSE 7

Room 702 Periods Th-4, Th-5

PAUL BOEDER, Ph.D.
Iowa City

Practical Optics

A two-period course—$4.00

The optical properties and practical aspects of single vision and contact lenses as well as of all types of multifocal lenses will be discussed: in particular, their defects and prismatic effects, such as object displacement, image jump, vertical imbalances, and decentration. This will be followed by a discussion of cataract and telescopic lenses, and finally, by a review of the optical principles of retinoscopy, and direct and indirect ophthalmoscopy.

COURSE 8

Room 713 Periods W-5, W-6

ALSON E. BRALEY, M.D.
Iowa City

Fundus Lesions:
Diagnosis with Slit Lamp

A two-period course—$4.00

Examination of the fundus and vitreous with the slit lamp is an aid to diagnosis. In order to see the fundus, the Hruby lens or a special contact lens is necessary. A thin contact lens allows the examiner to swing the slit lamp beam over a wide range when compared to the Hruby lens. The contact lens also gives the observer better stereoptic view of all the deep structures. The normal eye and pathologic eye examined with the slit lamp and contact lens demonstrates many a new observation and aid to the ophthalmologist.

COURSE 9

Room 711 Periods M-4, M-5 and T-4 or T-5 or T-6

COURSE 10

Room 711 Periods W-5, W-6 and Th-4 or Th-5 or Th-6

ROBERT J. BROCKHURST, M.D.
CHARLES D. J. REGAN, M.D.
Boston

Indirect Ophthalmoscopy

A three-period course—$6.00

This three-hour course is being presented twice, as Course 9 on Monday and Tuesday and as Course 10 on Wednesday and Thursday. **Please select course number according to days on which you wish to attend.**

This course will be divided into two parts. The first part will be a two-hour lecture on the technique and applications of indirect ophthalmoscopy. Slides of fundus paintings and a motion picture will be used to amplify the lecture material. The second part will be one-hour session in which each student will examine rubber eyes using the stereoscopic indirect ophthalmoscope.

The course will be limited to 36 students. All 36 students will attend the opening two-hour lecture. The class will then be divided into three groups, with 12 students in each group. Each group will meet for one hour on the following day, when each student will have the use of an indirect ophthalmoscope and an assortment of simulated eyes with which to practice. When ordering tickets, please indicate whether you wish to attend during the fourth, fifth, or sixth period on the second day.

COURSE 11

Room 795 Periods M-4, M-5, T-4, T-5, W-4, W-5, Th-4, Th-5

HAROLD W. BROWN, M.D., et al

Eye Muscles

An eight period course—$16.00

M-4 & 5—Physiology and Pathology of the Ocular Muscles

Harold W. Brown, M.D.
New York

The physiologic action of the individual muscles in conjugate and disjunctive movements (convergence, divergence) will be discussed and illustrated. From these normal physiologic acts, the pathologic variations will be developed and classified. Various methods of diagnosis, measurement of deviations, and the surgical and nonsurgical correction of these deviations will be presented.

T-4 & 5—Congenital Anomalies
Rudolf Aebli, M.D.
New York

The subject matter will cover the more usual congenital anomalies such as retraction syndrome and its variations, strabismus fixus, Marcus Gunn jaw-winking syndrome, paralyses of both elevators of one eye with true ptosis and pseudoptosis, and also congenital individual muscle anomalies. Differential diagnosis and treatment, if any, will be discussed.

W-4—Tests
Paul T. McAlpine, M.D.
Summit, N. J.

Tests in common use will be briefly described and their relative merits discussed. Emphasis will be placed on the screen cover test and its modifications. A practical routine muscle test will be outlined, and the technique of the various procedures will be described in detail.

W-5—Surgical Techniques in the Management of Motor Anomalies

William B. Clark, M.D.
New Orleans

The anatomy of the extraocular muscles with their fascial attachments will be briefly discussed. Techniques of the various operations on the extraocular muscles will be presented in detail.

Th-4 & 5 — Surgery of the Extraocular Muscles

Harold W. Brown, M.D.
Rudolf Aebli, M.D.

The indications and contraindications for surgical correction of heterophoria and heterotropia will be discussed. Special emphasis will be placed on the methods used in selecting the proper muscle or muscles for operation and the amount of correction that can be expected from the different types of surgical procedures.

COURSE 12

Room 715 Periods T-5, T-6

VICTOR A. BYRNES, M.D.
St. Petersburg, Fla.

Ophthalmic Filters

A two-period course—$4.00

In prescribing sunglasses or tinted lenses the following factors should be considered:

a. In what kind of light will these filters be used?

b. What effect do these light wave-lengths have on the eye if unfiltered?

c. What effects do the various filters have on the light distribution?

d. What is the effect on visicn of the changes in the light reaching the eye?

These factors will be discussed. Other topics for discussion will include sunglasses of different shades and the advantages and disadvantages of each; tinted lenses for constant wear; types of tinted lenses advocated for night driving and their defects; tinted

windshields and their transmission curves, uses and disadvantages; reflecting filters and their uses; relative merits of glass and plastic lenses; use of sunglasses with corrections for refractive errors; strength of corrections which can be ground in large-size sunglass lenses; polarizing lenses; shooting glasses; defects of clip-on lenses; filters for possible use in prevention of intraocular damage by atomic flash and other high intensity radiation.

COURSE 13

Room 752 Periods M-5, M-6, T-5, T-6, W-5, W-6, Th-4, Th-5, Th-6

ALSTON CALLAHAN, M.D., et al.

Ophthalmic Plastic Surgery: Fundamental

A nine-period course—$18.00

This course is planned for ophthalmologists whose experience with lid surgery has not been extensive. It is designed to teach methods for correction of the simple lid problems as outlined by the various instructors. Those who have taken the course should be able to repair most lid problems competently. Since it is integrated with the Advanced Course in Ophthalmic Plastic Surgery given by Dr. Wendell Hughes, and his colleagues (see Hughes et al., Course 27), it is recommended that it should be taken before Dr. Hughes' course, except by those who have had extensive lid surgery experience.

M-5—Basic Principles

Alston Callahan, M.D.
Birmingham, Ala.

Equipped with knowledge of the fundamental principles of lid surgery, experienced ophthalmic surgeons may successfully correct all minor lid deformities.

M-6—Surgical Anatomy of the Lid and Application to Lid Problems

Crowell Beard, M.D.
San Jose, Calif.

The surgical anatomy of the lids and anterior orbit will be demonstrated by dissections and color slides, and their surgical applications will be shown.

T-5—Lacerations of the Lid

Sidney Fox, M.D.
New York

The handling of early and late lid lacerations will be discussed. Indications for the various types of surgical repairs and their techniques will be outlined.

T-6—Entropion and Trichiasis

Merrill J. Reeh, M.D.
Portland, Ore.

Senile and cicatricial entropion are discussed. Their causes are studied, and the more efficient surgical procedures for their correction will be presented. Indicated methods of treating trichiasis will be given.

W-5—Ectropion and Lid Cicatrices

Edmund B. Spaeth, M.D.
Philadelphia

The causes of the major types of ectropion and the successful correction of these cases will be presented. The correction of other lid cicatrices as they develop from trauma and disease will be discussed.

W-6—Conjunctival Surgery

J. Gordon Cole, M.D.
New York

Methods of using conjunctiva or buccal mucosal membrane in repair of symblepharon, deformed upper or lower fornix, partial and complete reconstruction of the socket. Pterygium repair and recession of the conjunctiva in muscle surgery will be illustrated.

Th-4—Lacrimal Apparatus

Lester Jones, M.D.
Portland, Ore.

The essential anatomy for understanding the action of the lacrimal apparatus and accepted methods of surgery will be discussed.

Th-5—Enucleation, Evisceration

Alston Callahan, M.D.

Recently the trend has been towards evisceration, since a sphere inside the sclera

gives better motion to the prosthesis. Methods of performing the evisceration are shown. Neoplastic considerations are discussed.

Th-6—Panel for informal discussion, problem cases, and questions by those taking the course.

COURSE 14

Room 786 Periods W-4, W-5, W-6, Th-4, Th-5, Th-6

RAMON CASTROVIEJO, M.D., et al

Keratoplasties

A six-period course—$12.00

W-4—Anatomy of the Normal Cornea and Corneal Pathology, Including Keratitis, Dystrophies and Degenerative Diseases

Lorenz E. Zimmerman, M.D.
Washington, D.C.

W-5—Partial and Total Keratectomies

Jorge N. Buxton, M.D.
New York

Indication and techniques for partial keratectomies in primary, recurrent pterygiums with and without limitation of rotation (diplopia), pseudopterygiums and localized corneal scars. Annular keratectomy (Gunderson's procedure) for bullous keratopathy. Types of bullous keratopathy.

Indications and techniques in total keratectomies for optical, reconstructive or preparatory for keratoplasty and for cosmetic reasons. Repair of symblepharons when associated with aforementioned condition. Repair by conjunctival autoplasty or buccal mucosa graft obtained with scissor technique or electrical keratotome.

Contraindications to partial and total keratectomies and the need for partial, total or peripheral lamellar keratectomies.

Use of beta radiation in these conditions. Characteristics of different applicators with special reference to dosage, time and frequency of applications. Emission modified by filters and complications of overdosage.

Slides and film of material covered.

W-6—Lamellar Keratoplasty; The Preservation of Donor Material for Lamellar Keratoplasty

John Harry King, Jr., M.D.
Washington, D.C.

Lamellar or partial thickness corneal transplantation is a useful technique which has many applications in ophthalmology. It is a safer operation than penetrating (full-thickness) grafting and is the procedure of choice when benefit can be expected.

The indications and operative techniques will be discussed.

Lamellar grafting has not been popular in this country because the technique has not been well known and because donor corneas have not been available to the average ophthalmologist. Preserved donor corneas can now be used with success equal to that obtained with fresh donor material.

Preservation methods will be described and a new method will be shown which can be applied by any ophthalmologist who can preserve corneas for use in remote areas without complicated equipment.

Th-4—Penetrating Keratoplasty

Brendan D. Leahey, M.D.
Lowell, Mass.

Practical points in preparatory surgery and therapy, and in operating techniques and difficulties, will be stressed, with special emphasis on current trends in graft fixation. Various types of overlying and direct sutures and splints will be shown along with several recently designed instruments. The newest version of the author's preplaced track suture method will be included. With this technique, silk sutures are inserted, running 1 mm. on each side of the trephine mark. These are stained with methylene blue and pulled through, leaving blue tracks for the subsequent direct sutures. Corresponding preplaced sutures are inserted in the graft with the aid of a plastic turret-style holder. For grafts 7 mm. in diameter, overlying sutures are also utilized. The lecture will be illustrated by fifty slides and a sound motion picture of one operation.

Th-5—Indications for Keratoplasty; Eye Banks

R. Townley Paton, M.D.
Southampton, L. I., N. Y.

Indications for both penetrating and nonpenetrating grafts in the following groups of cases: keratoconus, interstitial keratitis, traumatic injuries, chemical burns, band-shaped keratitis, and the various types of dystrophies. Also, some time will be spent in discussing the indications for therapeutic grafts, as in the treatment of ulcers, herpetic keratitis, and traumatic cases.

A complete summary of an organization and needed personnel of Eye Banks will be given. Also, the handling of eyes from the time of the donor's death until they are taken to the operating room will be discussed, as well as the necessary procedure on the part of the family physician and the next of kin, and the shipment of eyes. There will be some discussion of the legal involvement, the time limit for the removal of eyes, and the time limit for the use of eyes for corneal transplantation.

Th-6—Keratoplasties in Unfavorable Eyes and Complications

Ramon Castroviejo, M.D.
New York

In unfavorable cases in which keratoplasty would almost certainly result in a cloudy or opaque graft, a preliminary operation may render some eyes favorable for corneal transplantation. Superficial vascularization may be excised first by partial or lamellar keratectomy. When the cornea remains thin after keratectomy, it may be improved structurally by lamellar keratoplasty. Postoperative beta-ray applications may be required to prevent the recurrence of corneal vascularization, which would render the eye unfavorable for keratoplasty. As soon as the eye becomes quiet, the cornea, improved structurally and without vascularization, is in a more favorable condition for a final corneal transplantation for optical purposes. In eyes severely scarred by burns and with symblepharon, preliminary corneoconjunctivoplasty, with or without buccal mucous-membrane graft and some type of keratectomy may be required to render the eye more favorable for keratoplasty. In cases where the use of living or preserved corneal tissue is not feasible, a final attempt may be made to improve the eye functionally with a keratoprosthesis. The good results obtained in very unfavorable cases are very limited, but the operation is indicated as long as there is good light perception and projection and tension in the eye is normal. The handling of the most important complications of keratoplasty will be briefly discussed.

Illustrated with films and kodachrome transparencies.

COURSE 15

Room 721 Periods M-6, T-6, W-6

GRAHAM CLARK, M.D.
New York

Retinal Detachment

A three-period course—$6.00

The following outline will be utilized:

I. Types of retinal detachment and their holes: causative mechanisms, surgical approach, and prognostic significance

II. Treatment of the simple detachment, with emphasis on the electrical principles involved in the use of diathermy

III. Treatment of complicated detachments, with discussion of the various procedures for shortening the sclera

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COURSE 16

Room 722 Periods T-4, T-5, W-4, W-5, Th-4, Th-5

ELIZABETH F. CONSTANTINE, M.D.
New York

ROBERT L. TOUR, M.D.
San Francisco

ARTHUR LINKSZ, M.D.
and
PHILIP SALVATORI
BY INVITATION
New York

Contact Lenses

A six-period course—$12.00

This course will cover the indications for and the use of corneal lenses and of the various types of scleral lenses, for both cosmetic and medical purposes. It will consist of discussions, demonstration of the contact

lenses in use, a demonstration of the molding technique, and a motion picture showing the manufacture of lenses. Discussions will be amplified by question and answer periods.

COURSE 17

Room 716 Periods M-5, M-6

EDMOND L. COOPER, M.D.
Detroit

Principles of Ocular Muscle Surgery

A two-period course—$4.00

The aim of muscle surgery is to align the visual axes. In cases in which a functional result can be expected, an operation should be considered only as a supplement to optical, medical and orthoptic treatment, but alignment must be attained if binocular vision is to be the end result. In cases in which only a cosmetic result can be expected, alignment is none the less important.

It is the purpose of this course to explain the principles which enable us to obtain the proper alignment of the visual axes. Included among these principles are (1) proper diagnosis; (2) operation as soon after onset as is feasible; (3) preoperative planning of amount of surgical correction to attempt and how this is determined; (4) technique; (5) complications and their management.

COURSE 18

Room 782 Periods M-4, M-5, T-4, T-5

COURSE 19

Room 782 Periods W-4, W-5, Th-4, Th-5

JACK C. COPELAND
Chicago

Streak Retinoscopy

A four-period course—$8.00

This four-hour course is being presented twice, as Course 18 on Monday and Tuesday and as Course 19 on Wednesday and Thursday. **Please select course number according to days on which you wish to attend.**

The following outline describes the steps of the demonstration:

1. Determining the neutral point
2. Revealing low astigmatic errors
3. Locating the zone of the astigmatic band
4. Determining the power of the cylinder
5. Estimating the type and degree of error without lenses
6. Refining axis position by "Guide Angle" technique
7. Plus cylinder procedure

COURSE 20

Room 731 Periods M-4, M-5

FRANK D. COSTENBADER, M.D.
Washington, D.C.

Muscle Problems

A two-period course—$4.00

COURSE 21

Room 731 Periods Th-4, Th-5, Th-6

A. GERARD DEVOE, M.D.
JOSEPH A. C. WADSWORTH, M.D.
GEORGE R. MERRIAM, M.D.
New York

Reconstructive Surgery of the Lids and Conjunctiva

A three-period course—$6.00

This course will include the repair of lid defects resulting from the excision of tumors, injuries, and congenital anomalies. The course will be illustrated by means of motion pictures, kodachromes, and other visual aids.

The basic principles related to the above problems will be discussed. The relative merits of surgery and radiation will also be presented. Time will be allotted for the discussion of individual problems.

COURSE 22

Room 705 Periods Th-4, Th-5

OLGA FERRER, M.D.
Miami, Fla.

Contact Lenses

A two-period course—$4.00

Practical application of contact lenses in surgery, as a diagnostic aid, and in the correction of optical defects will be presented. Attention will be given to problems arising in office practice regarding the indication for contact lenses, selection of type of lens, and fitting techniques.

Ophthalmometric reading, refraction, and fluorescein pattern are used as the basis for the prescription of the lens. Fitting time and wearing time will be discussed.

COURSE 23

Room 786 Periods M-4, M-5

GERALD E. FONDA, M.D.
Short Hills, N. J.
and
LOUISE SLOAN, Ph.D.
Baltimore

BY INVITATION

Subnormal Vision: Technique for Examination

A two-period course—$4.00

The technique for subnormal vision examination, with emphasis upon the importance of history taking, nonoptical methods of correction, and the sequence of examination procedures, including the trial of different types of lenses, will be considered.

Correction of 80 per cent of patients with subnormal vision can be accomplished from the trial case by extension of the routine eye examination. The types of lenses used are conventional lenses, strong reading additions for monocular and binocular use, doublet magnifiers, microscopic bifocals, and telescopic lenses. Bifocals with reading additions up to +32.00 diopters are successful.

Various lenses will be demonstrated, and indications for their use will be explained. Types of pathologic ocular conditions, favorable and unfavorable for correction, will be classified.

Method of testing visual acuity at 40 cm. for determining diopter power required for variable degrees of visual defect will be explained.

COURSE 24

Room 713 Periods M-6, T-6

M. WALLACE FRIEDMAN, M.D.
San Francisco

Binocular Indirect Ophthalmoscopy

A two-period course—$4.00

This course will consist of an illustrated lecture on the use of the binocular indirect ophthalmoscope, followed by practical instruction in the use of the instrument. Advantages, disadvantages and indications will be presented. Scleral depression will be emphasized. Demonstration and instruction in the technique will be presented.

A. Optics of indirect ophthalmoscopy
B. Comparison of direct vs. indirect ophthalmoscopy
C. Technique
D. Drawings of fundus
E. Specific uses
   1. Retinal detachment
   2. High myopia
   3. Cataract
   4. Tumors
   5. Foreign bodies
   6. Peripheral uveitis
   7. Examination of young children's fundi

COURSE 25

Room 734 Periods T-5, T-6, W-5, W-6

GLEN G. GIBSON, M.D., et al

Surgery of Heterotropia

A four-period course—$8.00

In the surgical management of heterotropia today there is a growing appreciation of the importance of correlating sen-

sory function with surgical planning. The first period of this course points up the shortcomings of some currently accepted classifications as they pertain to surgical planning. The relationship between adequate diagnosis and adequate surgical procedure will be detailed.

In the second hour, practical principles of surgical technique, and the means of avoiding technical pitfalls will be stressed.

The third hour will be devoted to a discussion of the surgical correction of combined horizontal and vertical deviations, with particular emphasis upon the surgery of paretic heterotropia.

In the fourth hour, a practical classification of sensory subnormality will be presented to demonstrate how the planning of the time, type, and amount of surgical correction is related to sensory function.

T-5—Surgical Implications of Classification in Anomalies of Binocular Position, Visual Perception, and Ocular Motility

Edwin C. Tait, M.D.
Norristown, Pa.

T-6—Important Details in Surgical Technique

Lewis R. Wolf, M.D.
Philadelphia

W-5—Selection of Operative Procedures in Paretic Heterotropia

Robison D. Harley, M.D.
Philadelphia

W-6—A System for the Selection of the Proper Time, Type, Muscles, and Amount of Surgical Correction for Heterotropia

Glen G. Gibson, M.D.
Philadelphia

COURSE 26

Room 733 Periods M-5, M-6

LOUIS J. GIRARD, M.D.
MARY C. FLETCHER, M.D.
Houston, Texas

Pleoptics

A two-period course—$4.00

The first hour will include a brief history of pleoptics; a discussion of methods; selection of patients; results; economics with respect to cost to the patient and cost of equipment; training of technicians.

The second hour will consist of practical demonstrations, including use of the visuscope and euthyscope, localizer, corrector, space coordinator and pleoptophor.

COURSE 27

Room 736 Periods M-4, M-5, T-4, T-5, W-4, W-5, Th-4, Th-5, Th-6

WENDELL L. HUGHES, M.D., et al

Ophthalmic Plastic Surgery: Advanced

A nine-period course—$18.00

This course will be given for those who have had at least a moderate amount of experience in plastic work. It is recommended that the Fundamental Course in Ophthalmic Plastic Surgery be taken before considering this course (see Callahan et al., Course 13).

M-4—Conjunctival Surgery

Wendell L. Hughes, M.D.
Hempstead, N. Y.

Various deformities and tumors of the conjunctiva will be discussed, including conjunctival grafts, mucous membrane grafts, conjunctival grafts and symblepharon. Methods of handling conjunctival tumors, pterygia, etc., will be discussed.

M-5—Entropion

Wendell L. Hughes, M.D.

Various types of entropion will be discussed under the headings of congenital, spastic and cicatricial. A discussion of trichiasis will be included.

T-4—Bony Orbital Conditions and Lacrimal Apparatus

Charles E. Iliff, M.D.
Baltimore

1. The nasal orbit with dacryocystorhinostomy as the main procedure.
2. The lateral orbit with orbital decompression and the approach for orbital tumors.
3. The inferior orbit with fractures resulting from injury, and the subsequent treatment.

T-5—Ectropion

M. Noel Stow, M.D.
Washington, D. C.

The senile, paralytic, spastic and cicatricial types of ectropion will be discussed. The indications for surgical repair, techniques, postoperative care, and end results will be demonstrated by the use of kodachrome slides.

W-4—Ptosis

Byron Smith, M.D.
New York

Following a brief discussion of the physiology and practical anatomy of the upper lid, the differential diagnosis of blepharoptosis will be evaluated. Common preoperative complications and situations will be illustrated. Enumeration of techniques and indications for their application will be coordinated with a discussion of postoperative care and postsurgical complications.

W-5—Reconstruction of Lower and Upper Eyelids

Deane C. Hartman, M.D.
Los Angeles

This course includes a discussion of removal of lesions from eyelid margins, inner and outer layers; methods of excision and repair of tumors involving one fourth, one third, and larger areas of upper and lower eyelids; cosmetic treatment of lid margins following repair.

Th-4—Burns and Major Lacerations

Joseph C. Hill, M.D.
Toronto, Ont., Canada

Kodachrome slides will be used to illustrate methods of treatment of burns, early and late, minor and major lacerations of the ocular adnexae.

Th-5—Socket Ablation and Exenteration

Howard Naquin, M.D.
Baltimore

The indications, various surgical techniques, operative complications, and end results of socket ablation and orbital exenteration will be presented.

Th-6—Panel Discussion

Discussion of interesting cases and questions from those taking the Course to the members of the panel. Participants will be encouraged to bring pictures and slides of cases for discussion.

COURSE 28

Room 732 Periods W-4, W-5, W-6

CHARLES E. ILIFF, M.D.
Baltimore

CARL CORDES JOHNSON, M.D.
Boston

JOHN S. CRAWFORD, M.D.
Toronto, Ont., Canada

ROBERT SCHIMEK, M.D.
New Orleans

Ptosis

A three-period course—$6.00

1. Anatomy of the lids
2. Types of ptosis
3. Operative correction: levator surgery; frontalis surgery; superior rectus surgery
4. Complications

COURSE 29

Room 710 Periods Th-5, Th-6

ARTHUR J. JAMPOLSKY, M.D.
San Francisco

Management of Esodeviations

A two-period course—$4.00

COURSE 30

Room 731 Periods W-5, W-6

FRITZ JARDON
Detroit

BY INVITATION

HUGH LAUBHEIMER
Ft. Lauderdale, Fla.

BY INVITATION

Fitting Ocular Prostheses

A two-period course—$4.00

This course will cover all aspects of techniques for fitting prostheses in enucleations, eviscerations and Burch eviserations. Doctors are invited to bring their problem cases for practical demonstrations. This should be of special interest to those doctors in the field who do their own fitting.

An extended question and answer period will follow.

COURSE 31

Room 750 Periods W-5, W-6

LESTER T. JONES, M.D.
Portland, Ore.

The Lacrimal Apparatus

A two-period course—$4.00

There is a great divergence of opinions as to the proper treatment for lacrimal gland dysfunction. Much of this is due to lack of knowledge of its anatomy and physiology. The first period will be devoted to discussions of indications and contraindications for various treatments. The second period will deal with surgical techniques, especially some of the newer ones for difficult cases. Our thesis will be that there is no case of epiphora that cannot be cured.

COURSE 32

Room 710 Periods M-4, M-5, M-6, T-4, T-5, T-6, W-4, W-5, W-6

WILLIS S. KNIGHTON, M.D., et al

Practical Essentials of Glaucoma

A nine-period course—$18.00

A practical course in glaucoma designed to familiarize the student with present-day thinking regarding classification, diagnosis and treatment. The practical application of modern concepts and methods of examination and treatment will be emphasized.

M-4—Introduction
Willis S. Knighton, M.D.
New York

M-5—Chronic Simple Glaucoma
Joseph S. Haas, M.D.
Chicago

M-6—Narrow Angle Glaucoma
P. Robb McDonald, M.D.
Philadelphia

T-4—Gonioscopy
Robert N. Shaffer, M.D.
San Francisco

T-5—Tonography
Andrew de Roetth, Jr., M.D.
New York

T-6—Medical Therapy
Irving H. Leopold, M.D.
Philadelphia

W-4—Secondary Glaucoma
Earle H. McBain, M.D.
San Rafael, Calif.

W-5—Surgery
John M. McLean, M.D.
New York

W-6—Congenital Glaucoma
A. Edward Maumenee, M.D.
Baltimore

COURSE 33

Room 728 Periods T-4, W-4, Th-4

HEDWIG S. KUHN, M.D., et al

Industrial Ophthalmology, 1961

A three-period course—$6.00

T-4—

Hedwig S. Kuhn, M.D.
Hammond, Ind.

In this opening presentation, the over-all picture of an industrial eye program will be covered. This includes: visual testing; eye hazards; protective equipment, visual standards; a few facts about emergency eye care; infrared and ultraviolet radiation hazards; professional participation in safety inside *and* outside the plant; discussion of facts and fallacies with lay personnel; discussion of new areas of endeavor, such as occupational orthoptic possibilities, monocular cataracts, the determination of estimated percent loss of visual efficiency, and importance of visual fields in workers over fifty years old. A few medicolegal problems will also be discussed.

W-4—Reducing Eye Hazards

Ralph W. Ryan, M.D.
Morgantown, W. Va.

The topic will be discussed from three angles: Industrial Engineering Measures to Increase Visual Efficiency and Reduce Eye Hazards; Individual Visual Aids and Eye Protective Devices; Emergency First Aid Facilities.

Th-4—Ocular Injuries

Roderick Macdonald, Jr., M.D.
Louisville, Ky.

Various types of ocular injuries as a result of industrial trauma will be outlined. The mechanics of the injury will be discussed briefly and illustrated where indicated. Prophylaxis against injuries by mechanical devices such as protective lenses will be given.

Emphasis on proper diagnostic approaches to injuries will be outlined.

Principles of management of different classes of injuries will be discussed in detail and various methods of handling specific cases outlined. Medicolegal implications of ocular injury will be pointed out.

Finally, longer term management of such cases will be discussed.

COURSE 34

Room 777 Periods Th-4, Th-5, Th-6

PLACIDUS J. LEINFELDER, M.D.
Iowa City

GEORGE BOUNDS, M.D.
Nashville

ROBERT J. HOLLENHORST, M.D.
Rochester, Minn.

Diagnostic Aids in Neuro-ophthalmology

A three-period course—$6.00

A consideration of the various neurologic and ophthalmologic techniques that are available to facilitate neuro-ophthalmic diagnosis. This will include a critical analysis of the use of perimetry, visual acuity, ocular rotations, pupillary studies, and ophthalmoscopy, and utilization of the neurologist and neurosurgeon in performing cerebrospinal fluid examination, ventriculography, pneumoencephalography and roentgenography with angiography. A discussion of the clinical application of these examinations to the neuro-ophthalmic syndromes will conclude the course.

COURSE 35

Room 706 Periods M-4, M-5, M-6

ALBERT N. LEMOINE, JR., M.D.

JAMES T. ROBISON, JR., M.D.

LARRY L. CALKINS, M.D.
Kansas City, Mo.

Fundus Lesions: Differential Diagnosis

A three-period course—$6.00

Kodachrome fundus photographs will be presented with discussion of the significant points in the differential diagnosis of the various types of fundus disease. Photomicrographs demonstrating the pathologic processes that produce the fundus picture will be shown. The correlation between the anatomic changes and fundus appearance will be discussed in detail.

COURSE 36

Room 721 Periods M-4, M-5

ARTHUR LINKSZ, M.D.
New York

Physiology of Vision

A two-period course—$4.00

Some problems of clinical visual physiology will be discussed informally, with demonstrations. Questions by the audience will be encouraged. Suggested topics include tests for color vision in the office; office tests for binocular vision and space perception; office tests for ocular motility and their physiologic bases; elementary clinical geometric optics (choice of bifocals, use of prisms, base curves, size lenses); principles of quantitative perimentry and scotometry (with special reference to the Goldmann perimeter); dark adaptation. As many of these topics as possible, or even entirely different topics, could be discussed, depending on the wishes of the audience.

COURSE 37

Room 722 Periods M-4, M-5

RALPH I. LLOYD, M.D.
Brooklyn

Diseases of the Cornea

A two-period course—$4.00

The slit lamp has had almost as important an effect upon our knowledge and treatment of the cornea and its diseases as the ophthalmoscope did in the hands of Graefe and his colleagues. This period will be devoted to study of corneal injuries and diseases, special attention being given to early diagnosis and treatment of the insensitive corneas occurring in Fuch's dystrophy and dendritic keratitis. The effects of hereditary dystrophies have been considered irreparable, but recent experience with corneal transplants has made reconsideration of established practices imperative.

COURSE 38

Room 788 & 789 Periods M-4, M-5, M-6, T-4, T-5, T-6, W-4, W-5, W-6

ROBERT J. MASTERS, M.D.
Indianapolis

HARVEY E. THORPE, M.D.
Pittsburgh

ALEXANDER A. KREIGER, M.D.
Pittsburgh

JOHN MELVIN MASTERS, M.D.
Indianapolis

FRED M. WILSON, M.D.
Indianapolis

CHARLES REEL, M.D.
Pittsburgh

THEODORE R. LeMASTER, M.D.
Indianapolis

Slit Lamp Biomicroscopy: Fundamentals

A nine-period course—$18.00

This course is especially planned for ophthalmologists who have not had the opportunity to learn how to use the slit lamp biomicroscope. The illustrated lectures have been shortened as much as seems commensurate with adequate elementary didactic instruction, in order to provide ample time for actual work with several types of biomicroscopes in the laboratory. If any registrant is especially interested in learning to use a particular kind of biomicroscope, he will be given this opportunity with the help of our instructors. During the many years since our group first began to present our Academy course in biomicroscopy, we have sometimes been disturbed by the thought that some of our inexperienced registrants were failing to learn as much as we wanted them to, because they were embarrassed in the presence of other class members who were more experienced. We have therefore set up this elementary course for those who want to start at the beginning and to enjoy the satisfaction of rapidly learning to use this indispensable instrument.

COURSE 39

Room 705 Periods M-4, M-5, T-4, T-5

JOHN M. McLEAN, M.D.
New York

JACK GUYTON, M.D.
Detroit

A. EDWARD MAUMENEE, M.D.
Baltimore

Practical Factors in Eye Surgery

A four-period course—$8.00

Each of the instructors will speak for one hour on practical points in surgery which he has found useful in his own hands and in teaching residents. They will also present lantern slides and motion pictures. While one instructor is speaking, the others will be present to give running comments on the speaker's ideas. The remaining time will be devoted to summary and consideration of points brought up by the class for specific discussion.

COURSE 40

Room 716 Periods W-5, W-6, Th-4, Th-5

MARSHALL M. PARKS, M.D.
DAN G. ALBERT, M.D.
Washington, D. C.

Eso-Deviations

A four-period course—$8.00

The two principal causes of nonparalytic esophoria and esotropia are (1) accommodative convergence and (2) tonic convergence. The objective of this course is to develop a method by which each of these causative factors can be recognized and treated. Illustrative cases of various types of such deviations will be used in order to make the material presented as practical as possible for the practicing ophthalmologist.

The following topics will be discussed:

1. Horizontal vergences
   a. Accommodative convergence
   b. Tonic convergence
   c. Fusional convergence
   d. Fusional divergence
2. Diagnosis and treatment of accommodative esotropia
3. Diagnosis and treatment of nonaccommodative esotropia
4. The special problem of small angle esotropia

COURSE 41

Room 796 Periods M-4, M-5, T-4, T-5, W-4, W-5

L. HARRELL PIERCE, M.D.
Baltimore

DONALD M. SHAFER, M.D.
New York

EDWARD W. D. NORTON, M.D.
Miami

Retinal Detachment

A six-period course—$12.00

Symptoms of retinal detachment and methods of treatment will be discussed, with special emphasis on slit lamp examination of the deep vitreous, indirect ophthalmoscopy, and scleral pressure. These methods should help to resolve difficulties in making accurate diagnoses and prognoses. Problems related to subclinical retinal detachment will be covered. The rationale and technique of retinopexy, of lamellar scleral resection and of scleral buckling will be compared. A discussion of technical difficulties will follow with special emphasis on reoperations. Complications encountered and results obtained will be presented.

COURSE 42

Room 744 Periods T½-5, Th-6

ADOLPH POSNER, M.D.
GEORGE GORIN, M.D.
New York

Office Gonioscopy

A two-period course—$4.00

The course is intended as a practical introduction to gonioscopy. The normal variations of the chamber angle as well as the factors which predispose to angle closure glaucoma will be discussed and illustrated

with lantern slides. Various pathologic changes observable gonioscopically will also be demonstrated, with particular emphasis on the application of gonioscopy in the diagnosis of glaucoma and its surgical management. A 20-minute film will be shown for a rapid review of the subject. Ample time will be given for questions and discussion.

COURSE 43

Room 777 Periods W-5, W-6

LELAND H. PREWITT, M.D.
Ottumwa, Iowa

Diagnosis and Therapy of Ocular Allergy

A two-period course—$4.00

1. Enzymatic concept of allergy should be utilized in diagnosis and therapy.
2. Careful detailed allergic history should be taken from infancy to present illness.
3. Skin tests and cytology will be demonstrated.
4. Treatment consists of an elimination program and desensitization.
5. Dosage is established by (a) titration method, and (b) severity of patient's symptoms.
6. Running history is most important: reevaluate the elimination program, psychotherapy and dosage. Each case must be properly evaluated continuously as modern day therapy may aggravate rather than resolve the problem.
7. Colored slides will illustrate cases of extraocular and intraocular allergy.

COURSE 44

Room 731 Periods T-4, T-5, T-6

ALGERNON B. REESE, M.D.
IRA S. JONES, M.D.
ROBERT M. ELLSWORTH, M.D.
New York

Clinical Aspects of Ocular Tumors

A three-period course—$6.00

The material to be presented in the three lectures is intended to be complementary. The emphasis will be on diagnosis, differential diagnosis, and treatment.

T-4—Dr. Reese: Intraocular and extraocular pigmented lesions, angiomas, and lid tumors

T-5—Dr. Jones: Expanding lesions of the orbit

T-6—Dr. Ellsworth: Retinoblastoma

COURSE 45

Room 726 Periods M-4, M-5

R. WINSTON ROBERTS, M.D.
Winston-Salem, N. C.

Glaucoma: Early Diagnosis

A two-period course—$4.00

Success in treating glaucoma has proved to be much greater when therapy is begun early in the course of the disease. Screening techniques for early detection of glaucoma cases will be described. Detailed study of suspected cases will be discussed, including the use of modern techniques of tonometry, visual field testing, and especially tonography, provocative testing with tonography, and gonioscopic technique and interpretation. Findings used in a diagnosis and proper classification of very early glaucoma will be reviewed.

COURSE 46

Room 724 Periods W-4, W-5

DANIEL M. ROLETT, M.D.
White Plains, N. Y.

Gonioscopy: Practical Application

A two-period course—$4.00

This course is designed for ophthalmologists familiar with gonioscopy. The use of gonioscopy will be described, first in the diagnosis of primary and secondary glaucomas; second, in the choice of medical and surgical therapy; third in the evaluation of surgical results. Particular emphasis will be given to the use of gonioscopy in the operating room.

COURSE 47

Room 740 Periods M-6, T-6, W-6

HUNTER H. ROMAINE, M.D.
New York

Difficult Problems in Refraction and Their Treatment

A three-period course—$6.00

A general review of the important problems related to refraction, including a review of the major refractive classifications, will be undertaken at the outset of this course. Following this, a thorough study of the unusual problems encountered in diseases such as aphakia, anisometropia, and amblyopia will be presented. The refractive sensitivity of an individual and its bearing on the correction prescribed, the methods used in prismatic correction in lenses, and the use of specialized lenses will be discussed. The significance of dominance and its relation to refraction will also be included in the lecture. The course is intended to be a general review of problems in refraction, including special attention to unusual problems.

COURSE 48

Room 743 Periods M-4, M-5, T-4, T-5

HUNTER H. ROMAINE, M.D.
New York

Ocular Motility Surgery

A four-period course—$8.00

Surgery of the ocular motor system will be considered from several aspects:

1. The relationship of the preoperative diagnosis and of the preoperative care to the surgical procedure to be undertaken
2. Types of surgical procedures, techniques used in these procedures, and instruments and suture material used in these procedures
3. The horizontal surgical procedures and their relation to existing conditions and to purely vertical muscular anomalies, as well as to combinations of these groups
4. The complications that occur, the handling of these complications, and ways and means to obviate complications.

The course will be illustrated by various motion pictures of surgical procedures.

COURSE 49

Room 743 Periods W-4, W-5

MORTON L. ROSENTHAL, M.D.
Brooklyn, N. Y.

Binocular Indirect Ophthalmoscopic Technique with Special Emphasis on Fundus Drawing

A two-period course—$4.00

COURSE 50

Room 706 Periods Th-5, Th-6

ALLAN A. ROSSBY, M.D.
PHILIP SALVATORI
New York
BY INVITATION

Contact Lenses

A two-period course—$4.00

A clinical course for the ophthalmologist in evaluating, prescribing and fitting corneal contact lenses. Scleral lenses of all types will also be studied.

Basic principles will be treated didactically as well as elaborated upon by practical demonstrations upon patients or course participants. Slides and films will aid in demonstrating all aspects of this field.

COURSE 51

Room 733 Periods W-5, W-6

A. D. RUEDEMANN, JR., M.D.
Detroit
and
WERNER K. NOELL, M.D.
Buffalo
BY INVITATION

Clinical Electroretinography: Theory and Techniques

A two-period course—$4.00

This course will consist of a discussion of the theoretical evaluation of the electroretinogram and its application to experimental and human techniques. Consideration will be given to methods used and clinical results obtained in a series of cases using a simplified protocol. Slides and demonstrations of techniques will be shown.

COURSE 52

Room 727 Periods M-4, M-5, T-4, T-5, T-6, W-4

A. D. RUEDEMANN, JR., M.D., et al

Practical Aspects of Contact Lens Fitting

A six-period course—$12.00

M-4—Indications and Contraindications; Nomenclature; Lens Types
A. D. Ruedemann, Jr., M.D.
Detroit

M-5—Types of Lenses; Examination Prior to Fitting; Keratometers, their Standardization and Pitfalls
Lester E. McCullough, M.D.
Detroit

T-4 & T-5—Keratometer; Trial Fit; Use of the Burton Lamps; Use of the Slit Lamp with Cobalt Lens; Fluorescein Patterns; Insertion and Removal
James L. Frey, M.D.
Detroit
William T. Sallee, M.D.
Livonia, Mich.

T-6—Adjustment, Fitting, and Symptoms; Problem Cases; "Psychology"—(a) How to Care for the Lenses, (b) How to Finish, (c) Instructions
Robert J. Crossen, M.D.
Detroit

W-4—Seminar
Fritz Jardon
William James Slack, M.D.
Detroit
BY INVITATION
and Panel

A motion picture will be shown between the first and second periods.

COURSE 53

Room 796 Periods T-6, W-6, Th-4

CHARLES L. SCHEPENS, M.D.
Boston

Recent Advances in Retinal Detachment

A three-period course—$6.00

The technique of use of a new portable indirect stereoscopic ophthalmoscope will be outlined. Methods for obtaining a limited chorioretinitis will be discussed, and this will include a review of advances in diathermy and light coagulation.

Progress in scleral buckling techniques includes the use of a silicone circling band. Indications and limitations of the method will be discussed. Recent concepts in the pathogenesis and treatment of giant retinal breaks will be presented.

COURSE 54

Room 732 Periods Th-4, Th-5

ROBERT A. SCHIMEK, M.D.
New Orleans

FRANKLYN P. BOUSQUET, M.D.
Savannah, Ga.

Clinical Gonioscopy and Tonography

A two-period course—$4.00

I. Gonioscopy

Gonioscopy will be demonstrated on human subjects, with emphasis on its practical applications. Members of the group will be given the opportunity to perform gonioscopy by each of the available gonioscopic techniques: with the various gonioprisms at the slit lamp, with the goniolens and the stereogonioscope, and with surgical gonioscopic methods. Members of the group will be assisted in using the gonioscope to observe the normal angle structures and their variations in human subjects. Stereoscopic viewers will be used to show landmarks of normal and abnormal angles as they actually appear during gonioscopy.

II. Tonography

The theory of tonography will be presented in simplified form, again with emphasis on its practical applications. Tonography will be demonstrated. Values, limitations and sources of error in tonography and its importance in office care of glaucoma patients will be discussed.

The correlation of gonioscopic and tonographic findings in determining diagnosis, treatment and prognosis will be stressed.

The suction cup technique will be demonstrated and the practical use of this test in determining the flow of aqueous and estimating the facility of outflow of the eye (both by indirect computation and by "recovery time") will be discussed.

COURSE 55

Room 724 Periods Th-4, Th-5

THEODORE F. SCHLAEGEL, JR., M.D.
Indianapolis

LOUIS N. HUNGERFORD, JR., M.D.
Seattle

Uveitis

A two-period course—$4.00

The practical approach to the management of uveitis will be emphasized. We will point out that many tests used for the diagnostic work-up of uveitis are valueless and simply waste the doctor's time and the patient's time and money. There are certain procedures which are of importance in the diagnostic work-up of uveitis; these will be discussed. The use of various therapeutic agents will be considered in detail.

COURSE 56

Room 733 Periods T-5, T-6

ABRAHAM SCHLOSSMAN, M.D.
and
BRUNO S. PRIESTLEY, M.D.
New York

Pleoptics

A two-period course—$4.00

Pleoptics is the greatest advance in the treatment of amblyopia in recent years, and it is especially valuable in the treatment of patients with eccentric fixation. A short discussion of newer concepts of the nature and pathogenesis of amblyopia will lead up to the subject of pleoptics. Theoretic principles of this form of therapy will be briefly discussed, but most of the session will be devoted to the practical details of pleoptics. The methods of Bangerter and Cuppers will be compared. Diagnosis of eccentric fixation with the Visuscope will be demonstrated, and the use of the Euthyscope and Coordinator will be considered in detail. The value of other instruments, such as the Pleoptophor, Localizer, Corrector, Centrophor, Kaleidoscope Trainer, etc., will be briefly pointed out. The concept of a defect in separation acuity and its treatment will also be presented. Other trends in therapy, such as Bietti's anti-suppressive therapy with oxygen and strychnine, and Bagolini's test, will be offered. Results of treatment will be submitted.

ALBERT E. SLOANE, M.D.
Boston

BERNARD C. GETTES, M.D.
Philadelphia

Refraction

The following three courses dealing with Refraction: Course 57, Course 58, and Course 59, will be under the direction of Albert E. Sloane, M.D. They may be purchased jointly or separately as your schedule permits.

COURSE 57

Room 778 Periods T-4, T-5

School Vision Testing: Program, Problems and Methods

Albert E. Sloane, M.D.

A two-period course—$4.00

This course will provide the ophthalmologist with background for this important phase of public health work. In recent years increasing emphasis is being placed on such programs throughout the country, and the eye doctor is more often asked to act either in an advisory capacity or in the actual setting up of such procedures. Various methods of testing will be demonstrated and their present relative merits discussed. Other important problems involved in such programs will be discussed.

COURSE 58

Room 778 Periods W-4, W-5

Telescopic Lenses and Other Aids for Subnormal Vision

Albert E. Sloane, M.D.

A two-period course—$4.00

In this course the ophthalmologist will be given an appreciation of the value and limitations of telescopic lenses and simple methods of testing their usefulness. Techniques for utilizing the various types of

lenses now available will be demonstrated. Many other aids for increasing the size of the retinal image are available, easily fitted, and quite inexpensive. These will also be presented with relation to their clinical application.

COURSE 59

Room 778 Periods Th-4, Th-5

Bernard C. Gettes, M.D.

A two-period course—$4.00

A. Criteria for Prescription of Prisms in Ophthalmic Practice

A working formula for guidance in prescribing prisms will be presented. The standard textbook can only generalize regarding this phase of treatment, since all cases must be considered individually. Nevertheless, some system of guidance is desirable and helpful even though subject to error. Our classification of heterophorias will indicate in which cases prisms should be prescribed and how the strength of the prism may be determined.

B. Drugs Used in Refraction

The place of cycloplegia in refraction has always been a controversial subject. Its advantages and shortcomings will be presented with indications and contraindications for its use. The relative merits of the several cycloplegics and the best methods for their administration will be considered. Miotics will be discussed, and their effect in accommodative strabismus will be considered.

COURSE 60

Room 712 Periods M-4, M-5, M-6

CHARLES G. STEINMETZ, III, M.D.
SAMUEL BLANK, M.D.
GERARD M. SHANNON, M.D.
Philadelphia

Ocular Emergencies

A three-period course—$6.00

Anesthesia and its allied problems regarding injuries to the lids, globe and other emergency conditions of the eye will be presented. Indications and contraindications to local or general anesthesia will be discussed from the standpoint of the risks encountered, not only generally but also in specific ophthalmic emergencies. The emergencies will include trauma, foreign bodies, acute glaucoma, corneal transplant surgery on emergency basis, and the management of patients having associated cerebral injury. Preparation and preliminary medication for local and general anesthesia will be given as well as specific instruction for management of patients on steroid therapy, cardiacs and diabetics. Tranquilization and aids for local anesthesia and a resume of hypotensive anesthesia in ophthalmology will be outlined. Choice of anesthetic in children as well as in adults with post-anesthetic management will be discussed.

Diagnosis and treatment of penetrating intraocular wounds will be considered. Localization and extraction of intraocular foreign bodies will be dealt with in detail. Complications of trauma will be explained and treatment will be enumerated. Industrial emergencies and irradiational problems will be outlined and discussed.

The care of injuries of the eyelids including marginal lacerations will be presented. Two methods of repair in order to avoid a notched scar will be covered in detail. First, the figure eight suture (being the most simple and most rapid method) and second, a modification of the Wheeler halving procedure will be discussed. Use of temporary and permanent tarsorrhaphy with emphasis on pressure dressings will be given with diagrams and demonstration. Lacerations involving the canaliculi will also be presented and methods used being dependent upon the location of the break in the canaliculus. A discussion of the early treatment of orbital fractures will be presented. Fractures will be divided into those involving the orbital rim and the so-called "blow-out fracture" in which the orbital rim is intact. Finally, repair of lid injuries where tissue loss has resulted will be presented briefly and will include the emergency measures necessary to preserve the globe.

COURSE 61

Room 715 Periods M-5, M-6

M. NOEL STOW, M.D.
L. CONNER MOSS, M.D.
Washington, D.C.

Diagnostic and Therapeutic Office Procedures

A two-period course—$4.00

Pathologic conditions requiring medical or surgical treatment which are encountered in office or clinic practice will be discussed. They are neither rare nor routine, but their early detection or effective management may present some difficulty.

During the first hour, practical study will be made of such problems as ophthalmic pain, detection of holes in the retina prior to detachment (direct ophthalmoscopy), herpes zoster, persistent twitching of the orbicularis, and daily use of mydriatics in cases of early cataract.

Included in the second hour will be discussion of the surgical treatment of chalazia, xanthelasmas, hemangiomas, papillomas, dyskeratoses, melanomas, and basal cell and squamous cell carcinomas.

Kodachrome slides will be used for illustration.

COURSE 62

Room 754 — Periods M-4, M-5, M-6, T-4, T-5, T-6, W-4, W-5, W-6, Th-4, Th-5, Th-6

GEORGIANA D. THEOBALD, M.D., et al

Histopathology

A twelve-period course—$24.00

The teaching will be by lecture, microprojection and microscope. It is recommended that the student review the normal histology of the eye before attending this course.

The Cornea

Frederick C. Blodi, M.D.
Iowa City

The normal histology will be reviewed. The anatomical picture will be correlated with the slit lamp examination of the cornea. The problem of corneal transparency will be discussed from an anatomical, chemical and physical point of view.

The general pathology of the cornea will be discussed in the following order: corneal edema, vascularization, keratitis, wound healing, epithelial changes and changes in Descemet's membrane and on the posterior corneal surface.

The specific pathology will include a discussion of suppurative and nonsuppurative keratitis, senile changes, corneal degenerations, and pigmentations.

Surgical Pathology of the Eye

Leonard Christensen, M.D.
Portland, Ore.

This presentation is concerned with the tissue alterations, pathogenesis and sequelae of the more common complications in intraocular surgery. The lectures will be illustrated with photomicrographs.

Pathology of the Optic Nerve

Windsor S. Davies, M.D.
Detroit

A classification of the pathologic changes as observed in the optic nerve will be presented. Various lesions will be demonstrated by lantern slides. A correlation will be made between clinical and pathologic findings.

The Retinopathies

William C. Frayer, M.D.
Philadelphia

The discussion will deal primarily with the histologic changes produced in the choroid and retina by hypertension, diabetes and arteriosclerosis. Particular emphasis will be given to the underlying anatomic and physiologic vascular disturbances. Histologic features of the retinopathies will be correlated with their clinical appearance and will be illustrated by lantern slides and microscopic sections.

Pathology of the Lens

Michael J. Hogan, M.D.
San Francisco

The purpose of this lecture will be to present the normal histology of the lens and the etiology and pathogeny of cataractous changes. The histopathology will be described in detail, including changes in the capsule, lens epithelium, and lens fibers. Senile cataract in its various manifestations will be discussed from a clinical and pathologic standpoint. Cataracta complicata of the posterior and anterior types will be demonstrated. Diabetic and metabolic cataracts will be discussed.

Pathology of Glaucoma

A. Ray Irvine, Jr., M.D.
Los Angeles

The instruction on glaucoma will include the pathologic changes found in open and in closed angle glaucoma. The usual causes of secondary glaucoma, such as occlusion of the central retinal vein, lens changes, and neoplasms of the anterior segment, will be discussed. The effect of increased intraocular pressure upon each part of the eye, such as destruction of the corneal endothelium with subsequent bullous keratopathy and necrosis of the iris with atrophy, will be included. There will be illustrative photomicrographs shown and actual slides of primary glaucoma will be presented.

Tumors of the Uvea

John S. McGavic, M.D.
Bryn Mawr, Pa.

All of the tumors involving the uveal tract will be discussed and illustrated. Both primary and secondary tumors will be included. Most of the time will be devoted to benign and malignant melanomas, as they are the most common. Nevi, neurofibromas, hemangiomas, leiomyomas, xanthoendotheliomas, lymphomas and various metastatic tumors will be presented. Microscopic sections will be available for study as well as for projection.

Tumors of the Orbit

Edith Parkhill, M.D.
Rochester, Minn.

BY INVITATION

Tumors of the orbit are of the same histopathologic types as those seen elsewhere in the body, but only a few occur in the orbit with any degree of frequency. The pathology of orbital tumors and of some conditions clinically simulating orbital tumors will be discussed.

Tumors of the Retina

William H. Spencer, M.D.
San Francisco

The gross and microscopic pathology of retinal tumors will be presented with particular emphasis on retinoblastoma. The discussion will include rates of occurrence, heredity, histogenesis, growth patterns, prognosis, and differential diagnosis.

Cells Found in Inflammatory Lesions

Georgiana D. Theobald, M.D.
Oak Park, Ill.

Cytology, pathology and sequelae of ocular inflammations will be discussed.

Granulomatous Infections of the Eye

Lorenz Zimmerman, M.D.
Washington, D. C.

Among the many different causes of "granulomatous inflammation" involving ocular tissues, are infectious agents which may be demonstrated histologically within the eye. These include nematode larvae, Toxoplasma, tubercle bacilli, leprosy bacilli, Treponema, inclusion bodies, and fungi such as Blastomyces and Cryptococcus. None of these are demonstrated with ease since a prolonged search of serial sections is necessary in some cases and special staining techniques are required in others.

"Granulomatous inflammation" is a term preferred to "granulomatous uveitis" since in many of these infections the process is neither primarily nor predominantly uveal. Sympathetic ophthalmia is the only type of granulomatous inflammation that is a true uveitis.

Nongranulomatous Infections of the Eye

Lorenz Zimmerman, M.D.

Eyes are seldom enucleated during the active phases of nongranulomatous uveitis. The pathologist, therefore, rarely has an opportunity to study the initial changes which take place in the tissues in nongranulomatous uveitis. By the time eyes are enucleated, there are usually complicated features which tend to obscure the basic tissue reaction. In those cases in which active inflammation is still present, the uveal reaction in some cases is predominantly lymphocytic, and in these cases there may be conspicuous nodular aggregations of lymphocytes. In others there is a more diffuse plasma cell reaction and in these, one frequently observes many Russell bodies. Because plasmacytosis has been correlated with antibody production, it is

possible that the dense infiltration of plasma cells indicates active antibody formation in the affected uveal tissue.

Nongranulomatous uveitis may involve primarily the anterior segment in which case the formation of anterior and posterior synechias, occlusion and seclusion of the pupil, iris bombe, secondary glaucoma, and complicating cataract are frequently observed sequelae by the time the eye comes to enucleation. In those cases involving the posterior segment, retinal degeneration and proliferation of the pigment epithelium are infrequently observed. Alterations in the vitreous are also seen.

COURSE 63

Room 793 Periods W-4, W-5

HARVEY E. THORPE, M.D.
Pittsburgh

and

SAMUEL BERMAN

BY INVITATION
Ozone Park, N. Y.

Intraocular Foreign Bodies

A two-period course—$4.00

A comprehensive survey of established and newly developed techniques for the removal of foreign bodies from the eyeball will be presented.

Magnetic and nonmagnetic intraocular foreign bodies create special surgical problems. Accurate determination of functional and anatomic damage is important. Methods for evaluation of extent of trauma to ocular tissues and of impairment of vision will be analyzed.

Location of foreign bodies by roentgenograms must be accurate for successful operation. The electroinductive locator is a distinct help in foreign body localization both before and during operation. These methods of localization will be elaborated in this course.

The surgical technique for removal of foreign bodies must be properly planned from incision to closure. Techniques for removal of foreign bodies from the anterior chamber, iris, lens, ciliary body, vitreous, and retina will be reviewed.

There will be a discussion of the management of associated complications, such as laceration, uveal and vitreous prolapse, traumatic cataract, retinal detachment and infection. A review of preoperative and postoperative care will be included.

COURSE 64

Room 788 & 789 Periods Th-4, Th-5, Th-6

HARVEY E. THORPE, M.D.
Pittsburgh

ROBERT J. MASTERS, M.D.
Indianapolis

ALEXANDER A. KRIEGER, M.D.
Pittsburgh

JOHN MELVIN MASTERS, M.D.
Indianapolis

FRED M. WILSON, M.D.
Indianapolis

Advances in Slit Lamp Biomicroscopy, and Applanation Tonometry

A three-period course—$6.00

This advanced course in recent developments in slit lamp biomicroscopy will cover:

1. Use of Hruby lens
2. Use of flat contact lens for slit lamp ophthalmoscopy
3. Slit lamp ophthalmoscopy and cycloscopy with 4-mirror gonioprism, also Goldmann 3-mirror lens
4. Applanation tonometry

These illustrated lectures will be fairly comprehensive. They will cover the new techniques in cycloscopy, the study of the equatorial region of the crystalline lens, the examination of the extreme retinal and vitreous periphery, and the technique of applanation tonometry. The study of the posterior vitreous and retina with the Hruby lens, with the contact lens, as well as with the gonioprism, and biomicroscope will be included in this course.

The first two periods of the course will be devoted to illustrated lectures and discussion. The last period will be spent in the demonstration room, where the students will be afforded practice with the new instruments utilized in making examinations of the lens periphery and posterior vitreous. Slit lamp ophthalmoscopy of the central and peripheral retina, which is a recent development, will be stressed; it is especially valuable in finding vitreous bands and peripheral retinal tears, as well as in the differential diagnosis of retinal pathologic changes.

The technique of applanation tonometry with Professor Goldmann's attachment to the slit lamp will be discussed and demonstrated. This is a new development in tonometry which obviates some errors introduced by the factor of scleral rigidity.

COURSE 65

Room 793 — Periods M-4, M-5, M-6, T-4, T-5, T-6

HARVEY E. THORPE, M.D.
Pittsburgh

HERMANN M. BURIAN, M.D.
and
LEE ALLEN
BY INVITATION
Iowa City

Slit Lamp Gonioscopy

A six-period course—$12.00

Slit lamp gonioscopy is essentially a major subdivision of biomicroscopy. This course, intended for the advanced student, will cover the subject of clinical gonioscopy. The original methods of gonioscopy will be covered in outline form. The newer methods of slit lamp gonioscopy employing contact prisms and reflecting contact lenses yield more information than methods not employing the slit lamp. They will be covered in detail.

The following subjects will be included in the discussion:

1. Angle microanatomy and some phases of angle development
2. Gonioscopic instrumentation
3. Correlation of the slit lamp gonioscopic view with histoanatomy
4. The normal angle
5. Congenital anomalies
6. Degenerative changes
7. Inflammatory diseases
8. Glaucoma and observations following operation for glaucoma
9. Cysts and tumors visible with the gonioscope
10. Observations following intraocular surgery
11. Trauma and foreign bodies of the angle

One period will be devoted to practical demonstration of gonioscopy with the slit lamp biomicroscope.

COURSE 66

Room 726 — Periods Th-4, Th-5

C. DWIGHT TOWNES, M.D.
Louisville, Ky.

Cataract Surgery: Complications

A two-period course—$4.00

The first part of this course will be a discussion of the method of preoperative examination and preparation of the patient and a description of the techniques used in the operation for lens extraction which are calculated to minimize the occurrence of complications. The second part of the course will consist of discussion of the methods of treatment of complications, with special emphasis upon delayed reformation, or late loss, of the anterior chamber with or without choroidal separation; postoperative uveitis; and secondary glaucoma.

COURSE 67

Room 728 — Periods M-5, M-6, T-5, T-6, W-5, W-6, Th-5, Th-6

RICHARD C. TROUTMAN, M.D., et al.

Recent Advances in Ophthalmology

An eight-period course—$16.00

This course is planned to give the practicing ophthalmologist a brief review of the

most important advances in the various fields under discussion. It will cover not only a review of the current literature in the field, but also personal experiences of interest of the various lecturers.

M-5—Ophthalmic Surgery
Richard C. Troutman, M.D.
New York

M-6—Neuro-ophthalmology
Robert S. Jampel, M.D.
Brooklyn

T-5—Pediatric Ophthalmology
Austin I. Fink, M.D.
Brooklyn

This new ophthalmologic specialty, which is rapidly developing, presents many interesting problems. Some new entities will be discussed. The author's method of handling pediatric patients will be presented.

T-6—Glaucoma
Bernard Schwartz, M.D.
Brooklyn

W-5—Strabismus
Abraham Schlossman, M.D.
New York

The newer concepts of strabismus surgery will be discussed. A complete analysis of the A-V syndromes will be given and latest developments in pleoptics will be stressed.

W-6—Plastic Surgery
Peter H. Ballen, M.D.
Hempstead, L. I., N. Y.

New or unique procedures for reconstructive surgery about the eye and orbit will be discussed. These procedures have been utilized or developed by the lecturer and have found a place in the surgical armamentarium of the resident and attending staff.

Th-5—Contact Lenses
Seymour Van, M.D.
Morristown, N. J.

BY INVITATION

Th-6—Detachment
Morton Rosenthal, M.D.
Brooklyn

A discussion of the newer techniques in operations for retinal detachment will be given, and an evaluation of these techniques with special reference to the newer techniques of scleral shortening and vitreous transplantation will be made.

COURSE 68

Room 750 Periods Th-5, Th-6

RICHARD C. TROUTMAN, M.D.
New York

Enucleation Surgery: Complications and Their Management

A two-period course—$4.00

Interest in enucleation surgery has received impetus in recent years due to the development of new implants and prosthetic techniques. These materials and techniques have imposed problems which have not been seen in large numbers by the average ophthalmologist. The added interest in this problem has made it possible for some of us to see and treat enucleation complications. A summary of my experience in the field will be presented, with accompanying case presentations and a motion picture demonstration of operative repairs.

In addition, the newer methods of prosthetic fitting will be presented by Mr. Hugh Laubheimer, emphasizing the close cooperation that is now present and which is necessary for the proper care of the patient with an enucleated eye.

COURSE 69

Room 738 Periods M-6, T-6, W-6, Th-6

JOSEPH A. C. WADSWORTH, M.D.
New York

BAYARD H. COLYEAR, JR., M.D.
San Francisco

Retinal Detachment

A four-period course—$8.00

The pathologic anatomy of retinal detachment will be presented and the relation of these factors to the clinical development of the disease will be shown. Aids in diagnosis and differential diagnosis will be described. Surgical procedures, including diathermy and the various types of scleral resections, will be discussed.

COURSE 70

Room 744 Periods T-5, T-6, W-4, W-5

MAYNARD C. WHEELER, M.D.
PHILIP KNAPP, M.D.
New York

Concomitant Strabismus: Diagnosis and Treatment

A four-period course—$8.00

The emphasis will be on the practical management of concomitant strabismus. The examination of the patient will be considered in detail. Nonsurgical treatment will be fully discussed. Indications and contraindications for orthoptic training will be stressed. Problems to be considered will include (1) the selection of patients with types of esotropia and exotropia amenable to operation, (2) the choice of muscles on which to operate, and (3) the decision regarding when to operate.

COURSE 71

Room 733 Periods Th-4, Th-5

GEORGE N. WISE, M.D.
New York

Retinal Diseases: Differential Diagnosis

A two-period course—$4.00

The importance of proper diagnosis in prognosis and therapy will be stressed. The points in differential diagnosis of retinal diseases will be demonstrated by kodachrome slides.

COURSE 72

Room 776 Periods M-4, M-5, M-6, T-4, T-5, T-6, W-4, W-5, W-6, Th-4, Th-5, Th-6

Home Study Course Discussion Periods

A twelve-period course—$24.00

These discussion periods will be conducted by members of the faculty of the Home Study Course in Ophthalmology, and will be based on subject material covered by the Course. They will provide a review of basic subjects and will present up-to-date clinical applications.

M-4—Embryology, Anatomy and Neuroanatomy

John Woodworth Henderson, M.D.
Ann Arbor, Mich.

M. Noel Stow, M.D.
Washington, D. C.

J. Lawton Smith, M.D.
Durham, N. C.

M-5—Physiology

Robison D. Harley, M.D.
Atlantic City

Elmer J. Ballintine, M.D.
Cleveland

Irving H. Leopold, M.D.
Philadelphia

M-6—Optics and Principles of Biomicroscopy

Bourne Jerome, M.D.
Minneapolis

Charles J. Campbell, M.D.
New York

Arthur Linksz, M.D.
New York

T-4—Refraction

Manuel L. Stillerman, M.D.
Chicago

Bernard C. Gettes, M.D.
Philadelphia

Gerald E. Fonda, M.D.
Short Hills, N. J.

Frank W. Newell, M.D.
Chicago

T-5—Ocular Microbiology, External Diseases and Aseptic Technique

Henry F. Allen, M.D.
Boston

Samuel J. Kimura, M.D.
Berkeley, Calif.

John F. McKenna, M.D.
S. Miami, Fla.

James H. Allen, M.D.
New Orleans

T-6—Perimetry and Neuro-ophthalmology

Robert W. Hollenhorst, M.D.
Rochester, Minn.

Edward W. D. Norton, M.D.
Miami, Fla.

John P. Wendland, M.D.
Minneapolis

Placidus J. Leinfelder, M.D.
Iowa City

Cecil W. Lepard, M.D.
Detroit

W-4—Extraocular Muscles

Hermann M. Burian, M.D.
Iowa City

Edmond L. Cooper, M.D.
Detroit

Hunter H. Romaine, M.D.
New York

W-5—Ophthalmoscopy and Medical Ophthalmology

Banks Anderson, M.D.
Durham, N. C.

Frank C. Winter, M.D.
Palo Alto, Calif.

George N. Wise, M.D.
New York

W-6—Pathology

John S. McGavic, M.D.
Bryn Mawr, Pa.

Michael J. Hogan, M.D.
San Francisco

Georgiana D. Theobald, M.D.
Oak Park, Ill.

Th-4—Pharmacology and Therapeutics

Alfred J. Kreft, M.D.
Portland, Ore.

John E. Harris, M.D.
Minneapolis

Andrew de Roetth, Jr., M.D.
New York

Kenneth C. Swan, M.D.
Portland, Ore.

Th-5 & 6—Ophthalmoscopy and Medical Ophthalmology

Banks Anderson, M.D.

Frank C. Winter, M.D.

COURSE 101

Crystal Room — Period W-5

RUDOLPH AEBLI, M.D.
New York

End Results of Muscle Surgery

The subject matter of this presentation will be a series of patients followed for a varying number of years, with an evaluation of the end results from a cosmetic and a functional viewpoint. Enthusiastic and excessive operation on the interni or the externi or the vertical muscles interferes with conjugate movements and with convergence and, too frequently, ends in disappointment in later years.

Adhesions, secondary contractures, muscle fibrosis and scar tissue formation are sequelae which produce unexpected and disappointing results and make subsequent corrective operations more difficult and uncertain.

Recession and resection operations are not simple innocuous procedures, especially on the obliques and the vertical recti. A careful dissection with retention of the muscle fascial envelope, maintenance of a good dry field, avoidance of undue trauma to the muscle and the adjacent tissues, and good wound closure are essential to success. In general, excessive crippling of the function of any one muscle should be avoided and the operation should be spread over multiple muscles, thereby retaining good parallel and nonparallel ocular movements.

COURSE 102

Room 726 — Period M-6

HENRY F. ALLEN, M.D.
Boston

Aseptic Technique in Ophthalmology

Recent outbreaks of postoperative endophthalmitis in large hospitals, in addition to sporadic cases in smaller ones, show that the danger of surgical infection is ever present. Many substances and certain devices used for purposes of sterilization can actually serve as carriers of infection. Many new developments have occurred in the fields of air filtration, skin antisepsis, and individualization of solutions for use in the eye. Sterility surveys of operating suites and office treatment facilities are now considered essential. Knowledge of newer preventive measures may reveal unsuspected inadequacies and forestall serious complications which might otherwise beset the most conscientious surgeon.

COURSE 103

Room 715 — Period M-4

BENNETT Y. ALVIS, M.D.
St. Louis

Glaucoma Surgery: Long-Term End Results

This study will present the course of the diseases and end results in eyes that have been operated on for various types and stages of glaucoma. It will be based largely on experience with a considerable number of private patients whose cases were followed for varying lengths of time up to thirty or more years. Some comparisons will be made with eyes treated for similar periods by nonsurgical means.

COURSE 104

Room 715 — Period T-4

JAMES M. ANDREW, M.D.
Columbus, Ohio

Eye Diseases in Children

The course will include discussion of the following topics:

1. Hospitalization of the young child

2. Congenital lacrimal obstruction
3. Dermoids
   a. Orbital
   b. Corneal-conjunctival
   c. Conjunctival dermatolipoma
4. Anesthesia for pediatric ocular operations and procedures

COURSE 105

Room 721 Period W-4

TAYLOR ASBURY, M.D.
Cincinnati

Practical Genetics in Everyday Office Practice

It is increasingly important that the clinician be aware of the practical importance of genetics in everyday practice. Much has been learned about the genetic background of many eye diseases. It is necessary to understand a few basic principles of genetics in order to be able to counsel patients in an intelligent way, but it does not require that one be an expert geneticist.

This course approaches the subject, in a simple way, beginning with the basic principles of dominant, recessive, and sex-linked inheritance. Practical advice to patients on retinoblastoma, strabismus, retinitis pigmentosa, glaucoma, and cataract will be discussed, as well as the more important recent developments in the field of genetics.

COURSE 106

Room 715 Period W-6

K. W. ASCHER, M.D.
Cincinnati

Cyclodialysis: Details of the Technique

Cyclodialysis is a glaucoma operation aiming to obtain a permanent cleft between the ciliary body and the inner surface of the sclera. Experience of more than five decades has proved its efficiency in open angle glaucoma and in secondary glaucoma following cataract extraction, as well as in eyes of Negroes and in stubborn glaucoma cases requiring re-operation. Mode of action, details of the technique, and postoperative care will be discussed with special regard to avoiding complications.

COURSE 107

Room 762 Period M-5

GUSTAV C. BAHN, M.D.
New Orleans

Orbital Disease

The diagnostic problems posed by orbital pathology continue to be among the most perplexing and frustrating of those encountered by the ophthalmologist. Their solution has, at best, been the result of educated guessing. Certain anatomic and physiologic features render the orbit and its contents particularly vulnerable to inflammatory, degenerative, vascular and neoplastic processes. These features are presented and their influence upon the genesis, course and final outcome of orbital pathologic changes is discussed. These processes are classified and a clinicopathologic profile for each is given. Diagnostic and therapeutic methods are presented, and their value in the management of orbital disease is considered.

COURSE 108

Room 712 Period T-5

ROBERT E. BANNON
Buffalo
BY INVITATION

Aniseikonia: Its Role in Refractive Problems

Every new correction of refractive errors changes the seeing conditions to which the patient has become accustomed. The magnitude of these changes and the patient's tolerances determine whether or not binocular vision will be comfortable and efficient. Aniseikonia (not equal images) is one condition which may arise. It is most frequently associated with the correction of unequal refractive errors, and in certain cases it can cause persistent discomfort.

A brief review of aniseikonia and space eikonometry will be followed by a discussion of various clues and procedures that are useful in detecting aniseikonia in routine office practice.

COURSE 109

Room 715 Period W-5

ROBERT E. BANNON
Buffalo

BY INVITATION

Practical Aspects of Multifocal Corrections

This course will review briefly various measurements (amplitude of accommodation, dynamic cross cylinder test, and the method of limits) that are helpful in determining near point corrections. Clinical data supporting the practice of leaving half the amplitude in reserve will be presented.

A procedure will be described for determining the proper add for unusual near distances when routine tests have measured the add necessary for a standard near test distance.

Once the amount of the add has been decided upon, it is necessary to select (or advise) the **form** of the lens correction. The factors which should influence a choice of separate near (single vision) glasses, fit-over lenses, bifocals or trifocals will be discussed.

Special attention will be given to the relative importance of image jump, object displacement, field of view with various segment sizes, segment decentration and ranges of clear vision with various adds.

COURSE 110

Room 712 Period W-5

OWEN BELMONT, M.D.
Philadelphia

Refraction: Causes of Failure

Failure in refraction is defined as any instance in which a patient rejects his glasses. The most common reasons for such rejection will be analyzed. Case histories will be outlined to illustrate each type of failure. Secondary effects of lenses which change and distort the patient's orientation in his environment will be discussed. Ways of anticipating and minimizing these undesirable defects will be presented.

COURSE 111

Crystal Room Period T-4

RAYNOLD N. BERKE, M.D.
Hackensack, N. J.

The Surgical Treatment of Congenital Ptosis

The three types of operations proposed for ptosis will be reviewed and the indications and contraindications for each cited with emphasis on resection of the levator as the operation of choice for most cases. Slides and motion pictures will be used to illustrate the lecture.

COURSE 112

Room 702 Period W-6

JEROME W. BETTMAN, M.D.
San Francisco

Radioactive Isotopes

This course is designed for the practicing ophthalmologist who wishes to understand radioisotopes better. It will especially emphasize their use in the study of factors that alter the intraocular blood volume.

The course will consist of (1) a very simple, easily understood explanation of the fundamentals of radioisotopes. Under consideration will be A, B, and G emissions; half life; differences in energy. Conditions under which only pure B emitters are useful in diagnosis and experimental work in ophthalmology will be discussed. (2) A brief consideration of the place and value of radioisotopes in therapy and in diagnosis, including the use and abuse of P_{32} in the diagnosis of intraocular neoplasms. (3) The experimental use of radioisotopes as an indication of the blood

volume of the choroid and retina. This sheds considerable light on which agents actually dilate the intraocular blood vessels and which agents do not. Deductions of very practical clinical significance will be made.

COURSE 113

Room 702 Period T-5

JEROME W. BETTMAN, M.D.
San Francisco

Value of Goniotomy

This course is really a practical, thorough, clinical discussion of congenital glaucoma.

The diagnosis, differential diagnosis, and prognosis of congenital glaucoma will be reviewed. Evidence will be presented to demonstrate that goniotomy is the procedure of choice in congenital glaucoma. Each of the modern techniques of goniotomy will be presented. The techniques of goniotomy without visual control, goniotomy with a contact lens, and goniotomy with continuous injection of air will be presented. Their merits will be compared, and the preoperative and postoperative care will be considered. Theories of the method of action of goniotomy will be discussed.

Goniotomy is one of the great surgical advances in modern ophthalmology. It has already saved many from a life of total blindness.

COURSE 114

Room 762 Period T-4

HAROLD M. BLOCK, M.D.
Dallas

Office Practice of Ophthalmology

In this course it is my intention to explain various types of office procedures for medical and surgical conditions, with the patients' reactions in mind, and in such a way as to have better patient-doctor relationships. Procedures learned in the clinics and hospitals will be explained from the viewpoint of their application in private practice. The course is especially designed for the young ophthalmologist.

COURSE 115

Room 710 Period Th-4

G. BONACCOLTO, M.D.
New York

Dacryocystorhinostomy

A review will be made of the various techniques devised and developed for the purpose of re-establishing the nasolacrimal drainage of tears.

The author will discuss and show motion picture demonstrations of the technique which he has devised. A simplified manner of approach to, and exposure of, the lacrimal sac is described together with the use of the Iliff-Stryker trephine to create the osseous opening. The modification of the usual dacryocystorhinostomy procedure involves the insertion of two sizes of polyethylene tubing through the canaliculus and lacrimal sac, which is incised, and then through the osseous perforation, into the nasal cavity. The use of these tubings facilitates the union of the lacrimal sac and nasal mucosal flaps, thus enhancing the creation of a permanent nasolacrimal fistula in a large percentage of cases.

COURSE 116

Room 781 Period W-4

G. BONACCOLTO, M.D.
New York

Enucleation Techniques: Present Status

Following a brief description of several of the newer innovations in the enucleation technique, this course will include a discussion of the different types of implants in use today and their relative advantages and disadvantages on the basis of (1) technique of muscle attachment to implant; (2) durability; (3) complications during and after the operation. The lecture will be illustrated with slides and motion pictures in color.

COURSE 117

Room 778 Period W-6

SOLOMON S. BRAV, M.D.
Philadelphia

Serous Choroidal Detachment

A short history of choroidal detachment will be presented. Discussion of the histopathology and pathogenesis will be considered and a classification of the various types of detachment noted. Various theories of the cause of this condition will be discussed and clarified.

Indications and contraindications for medical and surgical therapy will be dealt with in detail.

COURSE 118

Room 715 Period W-4

ARNOLD S. BREAKEY, M.D.
New York

Rehabilitation in Ophthalmology

This course will deal with the ocular manifestations of damage to the central nervous system in children, teen-agers and adults. The three groups are vastly different one from the other.

In **children** the problem is mainly one of oculomotor imbalance, especially esotropia, complicated by a high incidence of congenital anomalies. Gaze palsy, visual defects, ocular toxoplasmosis, ptosis, and nystagmus are frequently encountered. This group has a great ability to develop new pathways and recover their deficits. Generally accepted principles for ophthalmic care are not applicable to this group. The medical and surgical management will be stressed. Testing for perceptual defects will be discussed.

In **teen-agers** we see the results of childhood brain damage which has gone untreated. The incidence of subnormal vision is high. Exotropia predominates among motor imbalances. Field defects of the hemianoptic variety are frequently seen as well as perceptual defects. Cosmetic surgery is often beneficial.

In the **adult** group, central nervous system damage is most commonly due to cerebrovascular accidents and trauma. The resulting deficiencies are loss of visual field, accommodative insufficiency, ocular imbalance, diplopia, reading problems and optic atrophy. Since the ocular apparatus cannot be made to develop new central pathways by means of passive exercise, we must teach the patients to get along with "what is left." Rehabilitation from the ocular standpoint is most important to the "whole patient" because the handicapped person depends to an extra measure on his eyes. Appliances to facilitate this work will be exhibited. The problem of visual aphasia is a serious one. Its treatment will be discussed.

COURSE 119

Room 702 Period W-4

GOODWIN M. BREININ, M.D.
New York

Electromyography

The principles of electrophysiologic instrumentation as applied to electromyography of the extraocular muscles and to electro-oculography will be described, and the theory and application of these techniques discussed.

There will be a brief review of neuromuscular conduction. Illustrative slides and tracings will be shown of both normal and abnormal conditions involving ocular motility: comitant and paretic strabismus, ptosis, myopathies and nystagmus.

COURSE 120

Room 744 Period T-4

JOHN A. BUESSELER, M.D.
and
THEODORE E. KEATS, M.D.
BY INVITATION
Columbia, Mo.

Ophthalmic Radiology: Diagnosis

Soft tissue radiography of the eye, orbit and adnexa will be the area of interest in this course. Various techniques and methods of evaluation of particular interest to the ophthalmologist will be demonstrated and discussed.

The assessment of quality in a roentgenogram with regard to position, contrast,

and clarity of the image will be illustrated through the interpretation of plain films of the eye and orbit. Special consideration will be placed on the techniques involved in the production of such special studies as bone free radiographs and foreign body localizations. Contrast studies utilizing gases and radio opaque media will be shown in the form of orbital pneumograms, dacryocystograms and ophthalmic arteriograms with emphasis on the indications for and the methods of their production.

COURSE 121

Room 732 Period M-5

JORGE N. BUXTON, M.D.
New York

Total and Partial Keratectomies

Indications and techniques for partial keratectomies in primary recurrent pterygiums with and without limitation of rotation (diplopia); pseudopterygiums and localized corneal scars. Annular keratectomy (Gundersen's procedure) for bullous keratopathy. Types of bullous keratopathy.

Indications and techniques in total keratectomies for optical reconstructive or preparatory for keratoplasty and for cosmetic reasons. Repair of symblepharons when found associated with the forementioned conditions; repair by conjunctival autoplasty or buccal mucosal graft obtained with scissors technique or by electrical keratotome.

Contraindications to partial and total keratectomies, and the need for partial, total or peripheral lamellar keratoplasty.

Use of beta radiation in these conditions. Characteristics of different applicators with special reference to dosage, time and frequency of applications; modifications of emission by filters, and complications of overdosage.

Slides and a motion picture will illustrate the material covered.

COURSE 122

Room 716 Period M-4 or T-4

F. PHINIZY CALHOUN, JR., M.D.
Atlanta

Epithelization of the Anterior Chamber: Diagnosis and Treatment

A review of the pathogenesis, incidence, and histopathology of this condition, with detailed discussion of the clinical manifestations and recent developments in diagnostic tests and methods of treatment.

COURSE 123

Room 750 Period M-6

FRANK D. CARROLL, M.D.
New York

Optic Nerve Lesions: Differential Diagnosis

Lesions of the optic nerve must be first differentiated from lesions caused by intracranial expanding lesions and disorders of the macula. Then an etiologic differential diagnosis of the optic nerve condition may be sought. This includes consideration of conditions which are inflammatory, degenerative, vascular, neoplastic, or toxic. An outline of the author's approach to this problem will be presented.

COURSE 124

Room 750 Period T-4 or W-4

J. V. CASSADY, M.D.
South Bend, Ind.

Dacryocystitis and Lacrimal Drainage

The management of lacrimal drainage in infants and adults will be discussed and methods for relief of lacrimal passage obstructions will be explained. Fistula, concretions, traumatic laceration of the canaliculi, eversion of the puncta, canalicular and lacrimal duct stenosis will be considered. Dacryocystorhinostomy by the Dupuy-Dutemps method will be shown in film.

COURSE 125

Room 784 Period M-4

J. V. CASSADY, M.D.
South Bend, Ind.

Toxoplasmic Retinochoroiditis

Since uveitis causes such a large share of

blindness, a search for its etiology is justified. Specific treatment is superior to steroid therapy alone. Though serologic and clinical evidence suggests toxoplasmosis, the diagnosis of toxoplasmic retinochoroiditis must be presumptive. Toxoplasmic retinochoroiditis responds well to pyrimethamine and sulfonamides. This treatment should not be started unless symptomatic evidence suggests toxoplasmosis, because of the thrombocytopenic effect of these drugs on blood-forming organs.

COURSE 126

Room 752 Period W-4

WEBB CHAMBERLAIN, M.D.
Cleveland

Vertical and Horizontal Components in Strabismus

The importance of the vertical rotators in relation to horizontal squint will be presented, with particular emphasis on the A and V syndromes in upward and downward gaze. The evidence suggesting that the horizontal recti are the primary causative factors will be considered along with the indications that the obliques or the vertical recti are of basic significance. The diagnosis and treatment of these symmetrical A and V syndromes will be contrasted with the conventional management of vertical and horizontal anomalies not associated with this type of horizontal incomitance in the straight up and straight down positions.

COURSE 127

Room 705 Period W-5

MAX CHAMLIN, M.D.
New York

Perimetry: Techniques for Detection of Minimal Defects

Techniques for the detection of minimal defects in visual fields caused by early lesions of visual pathways will be demonstrated. The mounting of test objects on permanent carriers, as well as care of these test objects, will be shown. The choice of test objects and methods of recording various field defects will also be demonstrated. Principles which apply to the tangent screen as well as to the perimeter will be presented, and the interpretation of minimal findings will be explained. Cases in which the use of the perimeter entirely supercedes the tangent screen, as well as the reverse, will be shown.

COURSE 128

Crystal Room Period W-4

PAUL A. CHANDLER, M.D.
Boston

Surgical Complications of Glaucoma

COURSE 129

Room 705 Period M-6

MORTIMER R. CHOLST, M.D.
Neponsit, Queens, N. Y.

Central Fields: Methods and Techniques

Attention will be directed to patients with reduced corrected vision. Too often, pathologic changes are assumed to be the causative factor of the diminished vision and result in deferment of a central field recording.

The various methods and techniques presently employed in the mapping of central visual fields will be reviewed and their respective limitations and advantages will be discussed. This discussion will include the tangent screen and campimeter, with additional reference to the procedures employed in stereocampimetry.

Recent methods wherein test objects are not employed, such as those utilizing the Amsler charts and Harrington multiple-pattern screening instrument, will also be demonstrated.

Problems of technique to be reviewed will include a means for rapid determination of the patient's comprehension and ability to maintain satisfactory fixation, so vital to accurate visual fields.

A practical routine for evaluation of the central field in an eye with reduced corrected vision will be presented.

COURSE 130

Room 706 Period T-5

WILLIAM B. CLARK, M.D.
New Orleans

Surgery of Ocular Muscles

COURSE 131

Room 734 Period M-5

GILBERT W. CLEASBY, M.D.
San Francisco

Iris Tumors

The origin and natural behavior of various types of iris tumors, especially melanomas, indicate that these lesions are different from those arising elsewhere in the uvea. Management of a patient with a pigmented tumor of the iris presents problems as to the criteria for making a diagnosis of malignant melanoma, how best to treat the condition and what may be anticipated in terms of prognosis.

In this course a large series of iris tumors will be analyzed in an effort to outline and illustrate features of major importance in diagnosis, treatment, and prognosis. Various useful surgical techniques will be presented and discussed. Lesions and conditions most commonly encountered will be illustrated and discussed.

COURSE 132

Room 762 Period M-4

EDITH COHOE
Detroit

BY INVITATION

Reading Instruction for Partially Seeing Children

It is urgent that partially seeing children experience success in learning to read. Four important factors in their reading program will be discussed: establishing reading readiness, providing procedures and materials to make the act of reading easier, emphasizing thinking while reading, and relating reading to the other language arts. Certain devices and materials will be demonstrated and colored slides will be used.

COURSE 133

Room 750 Period T-6

ROBERT S. COLES, M.D.
New York

Office Management of Uveitis

This course will deal with a practical approach to the office management of uveitis. Theoretical aspects will be largely bypassed for more practical considerations. The extent of the diagnostic workup indicated in the various types of uveitis will be discussed along with those clues that point to a specific diagnosis without further studies.

Therapy of the different forms of uveitis will be reviewed in detail with particular reference to the management of those in which there is no specific diagnosis. Detailed descriptions of the use of the various therapeutic agents will be presented.

Management of the chronic and recurring forms of uveitis, as well as their secondary complications will be included.

COURSE 134

Room 702 Period W-5

BAYARD H. COLYEAR, M.D.
San Francisco

Problems with Light Therapy

COURSE 135

Room 711 Period W-4

TULLOS O. COSTON, M.D.
Oklahoma City

Inflammatory and Degenerative Disease of the Retina: Differential Diagnosis and Treatment

The subject matter to be covered will include senile macular degeneration, Kuhnt-Junius' degeneration, central angiospastic retinopathy, and the lesions of tuberculosis and toxoplasmosis. The author's method

of handling these conditions will be discussed. Colored lantern slides will be shown illustrating the various conditions.

COURSE 136

Room 712 Period Th-4

JACK P. COWEN, M.D.
Chicago

Pool Gonioscopy: Technique for Simplified Anterior Chamber Visualization

A simple study of the angles of the anterior chamber, particularly in all cases of glaucoma, can be accomplished by a lens-free method of flooding the inner angle of the eye with saline solution and of studying the submerged chamber angle with flashlight illumination and from five to ten power loupe magnification or, better still, with the detached binocular slit lamp head. The method will be demonstrated and discussed.

COURSE 137

Room 711 Period M-6

JOHN C. CUNNINGHAM, M.D.
Burlington, Vt.

Types of Head Pain as Viewed by the Ophthalmologist

The mechanism of head pain will be discussed. The clinical types of headache arising from intracranial, extracranial and paracranial sources will be reviewed. Particular attention will be given to head pain associated with cranial arteritis, migraine and orbital lesions. Lantern slides will be used in the course.

COURSE 138

Room 705 Period W-4

PAUL L. CUSICK, M.D.
Detroit

Ptosis Surgery: Practical Aspects

Blepharoptosis will be classified according to its causation. The various types will be illustrated with lantern slides. The procedures used by the author to correct the various types will be described, and will be illustrated with lantern slides to show the technique.

Overcorrection and its relief will be discussed, and the procedure used for levator recession will be illustrated with lantern slides.

COURSE 139

Room 786 Period M-6 or T-6

LOUIS DAILY, M.D.
Houston

Biomicroscopy of Vitreous and Fundus Oculi

Techniques of examination will be described. The relative values of slit lamps, and of contact lenses and preplaced lenses will be discussed.

The normal and pathologic biomicroscopic appearances of vitreous and fundus will be illustrated with colored transparencies made in Vienna under the direction of Karl Hruby and in Bern under the direction of Dr. Hans Goldmann. Types of detachment of the vitreous in association with pathologic states such as spontaneous collapse of the vitreous and hemorrhage into the vitreal space will be discussed and illustrated. Other conditions which will be described and illustrated are congenital anomalies of the optic disc and retina, retinitis proliferans, primary and traumatic detachments of the retina, intraocular foreign bodies, melanoma of the choroid, retinal cysts, retinal edema in diabetes and hypertension, macular holes, retinoschisis, and drusen. The clinical significance of these biomicroscopic observations will be discussed.

COURSE 140

Room 750 Period T-5

FREDERICK J. DAVIS, M.D.
Madison, Wis.

Sutures in Cataract Surgery: Types and Uses

The usefulness of sutures of some type

for firm closure of the deep cataract incision has been well-established over the past twenty years and is now universally recognized.

Among cataract surgeons there is a wide variation in number of sutures used, techniques of placement, type of suture material, needles.

This presentation will touch upon the history of closure of the cataract incision and present some of the methods of closure advocated by various modern surgeons. There will be a discussion and presentation through slides and motion pictures of conjunctival corneal, and corneoscleral edge-to-edge or border-to-border sutures inserted through the lips of the deep wound, overriding corneoscleral and episcleral and track sutures; buried gut sutures; preplaced and postplaced sutures, and suture removal.

COURSE 141

Room 777 Period M-5

ROBERT M. DAY, M.D.
New York

Medical Exophthalmos: Diagnosis and Treatment

The clinical concept of this orbital process, gained from observations in a large thyroid clinic, will be discussed. Terminology, symptoms, signs, course, differential diagnosis and treatment will be presented. The clinical picture will be especially emphasized, for the recognition of its variability is most important not only from the point of view of management but also in the evaluation of any form of treatment.

COURSE 142

Room 724 Period M-6

A. GERARD DEVOE, M.D.
New York

Surgery of Trauma

The principles and techniques most useful in handling injuries of the eye and adnexa will be discussed. Typical cases will be demonstrated by still and motion picture projection.

COURSE 143

Room 750 Period M-4

SAMUEL M. DISKAN, M.D.
Atlantic City

Eye Screening in Schools

The nationwide effort to discredit the medical profession and ophthalmologists by charging that vision testing in schools has been and still is inadequate urgently requires that we (ophthalmologists) do something to remedy this situation.

The course will present:

1. The nationwide problem of school vision testing
2. How to set up a school vision screening program
3. Normal standards of vision for school children
4. Eye tests which lend themselves to mass screening techniques
5. Demonstration of vision screening techniques and equipment

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COURSE 144

Room 702 Period M-5

JAMES R. DUKE, M.D.
Baltimore

Lesions of the Lids: A Clinical-Pathologic Survey

The more commonly encountered lesions of the lids will be surveyed from the following aspects: relative incidence of occurrence, clinical manifestations, criteria of differential diagnosis, and histopathologic characteristics. Kodachrome slides will provide a direct correlation of the clinical appearance of the lesion with the underlying histopathologic process.

COURSE 145

Room 716 Period W-4

EDWARD A. DUNLAP, M.D.
New York

Accommodative Esotropia: Treatment

This specialized form of esotropia has many facets. There are two types, and they are differentiated by basic findings and distinctive features. Establishment of the

diagnosis will be discussed in some detail. This is important because surgical intervention is almost invariably contraindicated in this type of esotropia.

General aspects of management will be covered. Treatment in the past has been almost solely with glasses, but the use of miotics, or "peripheral accommodation stimulators" such as DFP (Floropryl) and Demecarium bromide (BC-48), is rapidly increasing. Indications and contraindications for use of these drugs in the two forms of squint will be discussed. Case reports selected from a group of over a hundred patients so treated will be presented.

COURSE 146

Room 724 Period M-5 or T-5

EDWARD A. DUNLAP, M.D.
New York

Divergence Anomalies

These anomalies consist of divergence excess and divergence insufficiency. Each is characterized by certain specific findings that serve to differentiate it from an anomaly of convergence. In the Duane classification of strabismus they are in the group of Anomalies of Disjunctive Movements. They are nonparalytic.

Methods of diagnosis, characteristic findings, and typical case measurements will be presented for each form. A vertical component is frequently a complicating factor. Differentiation from the A-V syndromes will be brought out.

Treatment, both conservative and surgical, will be outlined. Tabulated results of a study on 247 cases will be presented, including 138 cases that have been surgically treated, with at least one year of follow-up.

COURSE 147

Room 706 Period Th-4

DAVID J. EDWARDS
Chicago

BY INVITATION

Abnormal Effects of Prescribed Lenses on Extrinsic Muscles

The first conclusive work on the extrinsic muscles was published by Mueller in 1859. In the past century, Whitnall, Fuchs, Bernheimer, Bing, Traquaire, Peters, Scobee, and many others have demonstrated the extrinsic abnormalities and their correlation to the intrinsic muscles and their influence on the ability of the two eyes to focus and direct simultaneously on the viewed image.

Many ophthalmologists today agree that the testing of extrinsic muscles is of equal value to the testing of intrinsic muscles if the patient ultimately is to have visual comfort. This fact is borne out by a great number of patients who receive comfort when only the extrinsic difficulties are corrected. Although a great many ophthalmologists do a routine phoria, near point and vergence examination, there are some who do not. Those who do often neglect the thorough checking of the prescribed spectacles against the manifest muscle condition. This is especially necessary when we consider that all multifocal lenses ground for the hyperopic presbyope induce base out prism for near, which is contraindicated.

This course will point out ways and means of checking the existing muscle findings against the finished pair of glasses. We will try to bring out photographically the results of the improperly fitted glasses on the manifested phoria condition.

COURSE 148

Room 777 Period T-4

JOHN A. EGAN, M.D.
Denver

Cross Cylinder: Application and Theory

The use of the cross cylinder as taught by Edward Jackson will be discussed. Improved models will be shown and uses devised since Jackson's time will be described.

Lantern slides will exhibit practical application of the cross cylinder. Large 2-foot models of the cross cylinder, trial cylinder and trial frame will be used to demonstrate general technique for use in refraction. Twelve different uses of the instrument, including the employment of the newer correcting cross cylinder, will be described.

A brief discussion of theories involved in the cross-cylinder method will be presented, and controversial aspects will be discussed.

This method of testing for astigmatism will be contrasted with other methods.

COURSE 149

Room 750 Period M-5

ORWYN H. ELLIS, M.D.
Los Angeles

Removal of Intraocular Foreign Bodies

Detailed discussion of roentgenographic localization including soft-tissue technique will be emphasized. Methods of expediting removal of unusual foreign bodies of the anterior chamber and ciliary body will be demonstrated. Special techniques for relocalization of intraocular foreign bodies not successfully removed at the first attempt will be described.

COURSE 150

Room 733 Period M-4

WILLIAM G. EVERETT, M.D.
Pittsburgh

Retinal Detachment: Selection of an Operation

The author will review the basic operations for retinal detachment, discussing the advantages and disadvantages of each procedure.

The four basic operations utilized by the author will be described and illustrated. The rationale for selection of an operation for retinal detachment will be exemplified with case histories, fundus photographs and fundus diagrams. Complications at surgery and postoperatively will be discussed.

The use of the Zeiss photocoagulator as a primary procedure and in conjunction with conventional surgery will be represented with accompanying slides.

COURSE 151

Room 702 Period M-4

RICARDO F. FERNANDEZ, M.D.
San Juan, Puerto Rico

Beta Radiation in Pterygium Surgery and Other Conditions

1. Brief outline of history of pterygium and its treatment.
2. Etiology, histology, symptomatology and indications for surgery.
3. Brief discussion of most widely used techniques, with statistics covering over 900 cases.
4. Beta radiation following pterygium surgery, with statistics covering over 350 cases treated in the last four years. Comparison of results with previous methods.
5. Complications of pterygium surgery, including those treated with beta radiation and soft x-rays.
6. Presentation of kodachrome slides illustrating results and complications.
7. Short color film illustrating our present surgical technique with application of beta radiation.

COURSE 152

Room 777 Period M-6

WALTER H. FINK, M.D.
Minneapolis

Binocular Problems in Routine Refraction

Although the correct selection of lenses solves most of the refractive problems, there remains an appreciable number of cases in which a binocular problem is present to some degree. Because of this, a routine study of the binocular efficiency of all refraction cases is indicated. Although some require a minimum of study, others require an extensive analysis of the binocular function for proper evaluation.

In the presentation. the steps in the investigation of binocular efficiency as carried out in routine refraction are evaluated and the various problems encountered are discussed, particularly the association between heterophoria and the fusional reflexes.

COURSE 153

Room 732 Period T-4

WALTER H. FINK, M.D.
Minneapolis

Vertical Muscle Surgery

A. Indications for Vertical Muscle Surgery
   1. As applied to the vertical muscle as a whole
   2. As applied to one or more vertical muscles
   3. As applied to combined vertical and horizontal muscle problems

B. Surgical Procedures
   1. Anatomic factors which determine surgical techniques
   2. Description of various surgical procedures

C. Complications Resulting from Improper Management

COURSE 154

Room 715 Period Th-4

SHERMAN B. FORBES, M.D.
Tampa, Fla.

Cyclodiathermy

Cyclodiathermy is a safe procedure since the advent of applying the current at a greater distance from the limbus. The safety of this procedure has been proved by a series of several hundred operations. Cyclodiathermy should be used as a primary procedure in certain types of glaucoma and not used solely as an operation of last resort. The indications and contraindications for the primary application of cyclodiathermy are described. A short motion picture illustrates the surgical technique used by the author. The complications encountered and their management are discussed.

COURSE 155

Room 736 Period M-6

SIDNEY A. FOX, M.D.
New York

Senile Ectropion and Entropion

Operative procedures best adapted for the correction of various clinical types of mild and severe senile ectropion and entropion will be considered and the reasons for each choice explained. The steps in the various techniques of surgery will be systematically outlined.

The modern theories of the etiology of senile ectropion and entropion and the evolution of the surgical techniques for their repair will be discussed in brief.

COURSE 156

Room 778 Period M-4

WILLIAM C. FRAYER, M.D.
Philadelphia

Retained Lens Protein After Operation and Trauma: Recognition of Danger and Treatment

Inflammatory reactions and secondary glaucoma occur frequently following operation or trauma in which the lens has been damaged. Many such reactions can be successfully treated if their causes are recognized early enough. The various mechanisms producing inflammation and glaucoma, following injuries of the lens, will be discussed. Clinical and histopathologic material will be demonstrated and methods for the management of these reactions will be outlined.

COURSE 157

Room 784 Period T-4

BERNARD FREAD, M.D.
New York

Ideal Refraction Equipment: Survey of Instruments Used

Refraction is most important in the daily routine of every ophthalmologist. A good part of each working day is spent with details of refraction and not enough emphasis has been placed upon the tools necessary to make refraction easier, more accurate, and less time consuming.

Every major refraction instrument manufactured in the United States and in the larger optical plants of England, France, Germany, Italy, Japan and Switzerland will be discussed. About two hundred lantern slides will graphically illustrate this equipment.

Attention will be given not only to elementary equipment used by the beginner but also to elaborate devices used for the objective and subjective measurement of refraction of particular interest to the experienced ophthalmologist.

The name, function, manufacturer, and current cost of the various instruments will be reported.

COURSE 158

Room 778 Period T-6

WILFRED E. FRY, M.D.
Philadelphia

Inflammatory and Degenerative Lesions at the Posterior Pole of the Eye: Differential Diagnosis

Not only must a differential diagnosis be made between inflammatory and degenerative lesions at the posterior pole of the eye but these conditions must also be distinguished from malignant lesions. The factors governing diagnosis of malignant lesions at the posterior pole of the eye will differ from those governing diagnosis of lesions in the midzone or in the anterior segment. When the lesion is in the midzone or the anterior segment, distinction must be made between a serous and a solid detachment. When the lesions are in the posterior segment the diagnosis must be made upon the ophthalmoscopic appearance plus all other information that can be afforded by a complete examination of the patient.

The situation is different when the macula alone is involved than when the region of the disc is involved.

Types of lesions as they involve the macula and the perioptic region will be illustrated and their management discussed.

COURSE 159

Room 762 Period W-5

MILES A. GALIN, M.D.
New York

Osmotic Therapy in Ophthalmology

The purpose of this course is to discuss the use of osmotic agents in ophthalmology, with particular reference to intravenous urea. The theoretical basis for this type of therapy will be reviewed, and the clinical applications demonstrated.

The use of urea in acute angle closure glaucoma will be considered at length. Its use in retinal detachment surgery, cataract surgery, and glaucoma surgery will be reviewed. The technique of administration with respect to dose, rate, and complications will be stressed.

COURSE 160

Room 784 Period T-5

SAMUEL GARTNER, M.D.
New York

Fundus Diseases: Clinical and Pathologic Correlations

The fundus pictures in many diseases will be correlated with the clinical course of the disease and essential pathologic findings. Numerous photomicrographs of eyes obtained at autopsy will demonstrate the vascular diseases, blood dyscrasias, diabetes, and a number of neurologic disorders, including papilledema, optic neuritis, multiple sclerosis and the chiasmal syndrome.

COURSE 161

Room 705 Period T-6

J. CONRAD GEMEROY, M.D.
Detroit

External Diseases

This lecture on external eye diseases, their diagnosis and treatment, is illustrated with kodachrome slides to show the usual, as well as some unusual, diseases of the lids, conjunctiva, and cornea. These illustrations will be projected stereoscopically in color on the screen.

COURSE 162

Room 762 Period T-5

HELEN GIBBONS
New York

BY INVITATION

Educational Management of Partially Seeing Children

A course designed to bring to ophthalmologists basic information regarding educational planning for partially seeing children. The course will include discussion of identification of partially seeing children through follow-up of vision screening, the three types of educational programs now in effect, material and equipment suited to the needs of these children, the role of the ophthalmologist in educational planning. The film, "A Fair Chance for Tommy," which depicts integration of the partially seeing child into the regular school program, will be shown and discussed.

COURSE 163

Room 743 Period M-6

HAROLD GIFFORD, JR., M.D.
Omaha

Local Anesthesia with Special Reference to Deep Motor Block

The methods of producing complete ocular anesthesia as well as complete motor block of the extraocular muscles will be discussed. The anatomy of the orbit with reference to the nerves and blood vessels will be reviewed in detail. The technique will be described with slides and motion pictures. This technique produces a long-lasting anesthesia and reduces the pressure on the globe from the extraocular muscles. This is important to prevent vitreous loss and has proved valuable in strabismus and retinal surgical procedures.

COURSE 164

Room 784 Period M-5 or T-6

JOHN F. GIPNER, M.D.
Rochester, N. Y.

Recent Advances in Ophthalmic Surgery

This lecture will include a review of the refinements in cataract surgery, including a discussion of shelving versus perpendicular section; advantages of buried corneoscleral sutures, and value of alpha-chymotrypsin in the control of several complications.

New ideas in glaucoma surgery, including peripheral iridectomy without loss of aqueous for narrow angle glaucoma, will be discussed. New techniques for fistulizing operations in chronic glaucoma, including the Stallard and Scheie operations, and techniques for retinal detachment surgery will be presented.

COURSE 165

Room 778 Period M-5

ISADORE GIVNER, M.D.
New York

Ophthalmo-Iatrogenic Disorders

Today, with the introduction of new chemical agents at a rate of about 400 a year, it behooves every physician to be on guard that he does not precipitate dysfunctions in the various systems of the body.

Half of the time will be utilized showing how the ophthalmologist may inadvertently, by the use of drugs, activate latent disease in various parts of the body, and in reverse fashion tell how specialists in other fields may bring on ocular dysfunction by their medication.

During the latter half of the hour various parts of the eye, such as conjunctiva, cornea, muscles, lens, retina and optic nerve will be discussed, and with the aid of kodachromes, changes brought on by iatrogenic etiology will be shown.

COURSE 166

Room 724 Period T-4

ELIOTT B. HAGUE, M.D.

DEANE BABBAGE, M.D.

BY INVITATION

DONATO CARBONE, M.D.

BY INVITATION

WILLIAM M. HOWARD, M.D.

CONRAD MIETUS, M.D.
Buffalo

Local and General Anesthesia in Ophthalmology

A symposium offers obvious advantages in dealing with techniques of anesthesia in eye surgery.

Local anesthesia with adequate sedation is the choice of many surgeons. Dr. Walter Atkinson has made many valuable contributions in this field, and his handling of the subject didactically has been valuable.

In the past decade, however, there has been a trend in various localities and hospitals to employ general anesthesia for intraocular surgery.

In this course part of a group using general anesthesia for most cases in this field will outline and discuss procedure and the teamwork which exists in our hospital between the ophthalmologic surgeon and the anesthetist.

COURSE 167

Room 762 Period M-6

GEORGE M. HAIK, M.D.
New Orleans

Mechanics of Intracapsular Cataract Extraction

The primary objective of cataract surgery is to deliver the lens by a technique which is simple and safe, and which is attended with a minimum of postoperative complications. In spite of the numerous improvements which have been introduced, a technique which meets all of these criteria has not yet been found. On the contrary, all of the techniques now employed are sometimes associated with serious hazards and may be followed by serious complications.

For many years intracapsular extraction has been the preferred technique of cataract surgery. One reason, perhaps, that it is not yet as satisfactory as it might be is that too little attention has been paid to the preliminary steps of releasing the lens from its attachments and its subsequent subluxation. When these steps have been accomplished properly, without rupture of the lens capsule, the remaining steps of the operation are usually relatively easy.

COURSE 168

Room 744 Period W-6

G. PETER HALBERG, M.D.
New York

Tear Formation: Clinical Problems

The course will open with a short review of the anatomy and physiology of the tear-forming organs.

Clinical conditions of the anterior segment of the eye will be discussed as they relate to tear formation.

Diagnosis and treatment will be emphasized. Clinical diagnostic methods: Schirmer tear test, paper electrophoresis of tear fluid, Wood light technique and a new **instant tear test** will be demonstrated.

Contact lens intolerance will be discussed in light of tear formation studies. Contact lens problem cases will be demonstrated from the point of view of tear physiology and pathology.

Practical demonstrations, and kodachrome slides will illustrate the course.

COURSE 169

Room 762 Period W-4

THOMAS R. HEDGES, JR., M.D.
Philadelphia

Headache: Its Diagnosis and Treatment

This subject, important in the daily practice of our specialities, concerns, primarily, a proper evaluation and classification of head pain with relation to its fundamental mechanisms. Once a clear outline of their differential diagnosis and origins is presented, all the neuralgias of the face, both typical and atypical, as well as other types of vascular headaches and head pain from other causes, can be treated intelligently. Each year new methods of diagnosis and treatment appear in the literature. These will be covered in detail with particular aim toward the practical office management of these problems.

COURSE 170

Room 744 Period M-6

JOHN W. HENDERSON, M.D.
Ann Arbor, Mich.

Intracranial Arterial Aneurysms: Ophthalmic Findings

The ophthalmic findings of arterial aneurysms of the circle of Willis will be discussed on the basis of a series of 119 cases studied at the University of Michigan. Cranial nerve involvement, visual symptoms and findings, and funduscopic findings will be analyzed. Case summaries and arteriograms of pertinent patients will be noted. The importance of the ophthalmologist's early awareness of such a diagnosis is stressed.

COURSE 171

Room 732 Period M-4

ANDERSON C. HILDING, M.D.
Duluth, Minn.

Practical Analysis of the Mechanics of Vitreous Motion

Before one is able to assign to the vitreous the role it plays in ocular pathology, it is necessary to understand its behavior under normal as well as abnormal circumstances. The present study has two phases. The first describes the vitreous movements and attachments as observed in phakic eyes and the second presents observations on the form, movement and structure of the vitreous in aphakic eyes. The movements of the vitreous and the forces which bring them about are doubtless of great importance in a number of disease conditions, including detachment of the retina and postoperative complications of intraocular surgery. Hoping that a study of these forces might be fruitful in a better understanding of pathologic conditions of the vitreous and retina, and that this understanding might prove useful in the prevention and treatment of these conditions, the studies on the mechanics of vitreous motion were undertaken.

In the study on normal phakic eyes, the vitreous movements observed in freshly enucleated ox eyes are described; the forces involved in movement of the vitreous are analyzed and slit lamp observations of phakic human eyes, to study the pattern of movement of the vitreous, are included. With the information available from these observations, the points of greatest strain upon the vitreous attachments during rotation are considered.

The study on aphakic eyes after intracapsular cataract extraction calls attention to the altered anatomic relations in the anterior portion of the eye and the resulting mechanical effects after this procedure. The postoperative appearance of the hyaloid membrane took on a multitude of forms which are described and illustrated. Postrotational movements of the vitreous were studied in these aphakic eyes through the corneal microscope and, from these observations, one is able to speculate about the mechanisms for intraocular trauma, such as retinal tear and macular damage. Other findings include adhesions of the vitreous, shrunken vitreous and liquefied vitreous. The possible significance of these changes is discussed.

COURSE 172

Room 721 Period Th-4

HOWARD F. HILL, M.D.
Waterville, Maine

Cataract Surgery: Keratome and Scissors Technique

Incision and closure of the cataract wound will be discussed, with special reference to certain advantages in using the keratome and scissors. Emphasis will be placed upon many small details that are occasionally overlooked, each one of which is important in perfecting this technique.

Proper use of special instruments will be discussed. Improved methods of wound closure and suture technique to avoid immediate and postoperative complications will be described. An evaluation of chemical zonulysis and a method of limited chemical zonulysis will be given.

Procedures will be illustrated with slides and motion pictures.

COURSE 173

Room 778 Period M-6

WILLIAM T. HUNT, JR., M.D.
Philadelphia

Problems in Accommodation: Finding of Near Point

The distant refractive state will first be considered. Balancing the refraction for distance and near is a concern. Factors which may modify the distant correction for use at near points, such as accommodation, phoria and other findings will be evaluated in their relationship to each other. The use of the cross cylinder at near, including its use with grid charts and the red-green lantern findings, is to be discussed.

COURSE 174

Room 784 Period M-6

JERRY H. JACOBSON, M.D.
New York

Electroretinography

The change in the electrical status of the retina when it is functioning can be detected and recorded by the relatively simple technique of electroretinography. The test has been shown to be of value in the early diagnosis of retinal degenerations, in retinal detachment, and in evaluation of the status of a retina obscured from ophthalmoscopic view by cataract, vitreous or corneal opacity.

This course will include a description of the technique of the test, with emphasis on the facility with which it can be performed in almost any hospital, and a discussion of present and future applications. A motion picture will illustrate the actual technique. The related electrophysiological technique of electromyography will also be discussed.

COURSE 175

Room 777 Period W-4

CHARLES E. JAECKLE, M.D.
Defiance, Ohio

Nonstrabismic Motor Abnormalities: Diagnosis and Treatment

Vergences in terms of stimulus-response mechanisms are reviewed. With this physiologic background, a clinically useful classification of nonparalytic oculomotor abnormalities will be presented. The role of accommodation and fusional deficiencies in relation to heterophoria and comfortable binocular vision will be emphasized.

Specific signs and symptoms of nonstrabismic motor disturbances will be indicated. Simple, effective methods of diagnosis and treatment with the aid of basic office refraction equipment will be presented.

COURSE 176

Room 784 Period W-4

FRED JOBE
Rochester, N. Y.
BY INVITATION

Ophthalmic Instruments: Practical Information

The efficient use of an instrument depends to a large extent on its maintenance and adjustment. A knowledge of the performance that can be expected is basic in the proper use of any instrument. This course is designed to give the ophthalmologist a better understanding of his equipment. The fundamental design and construction of the commonly used instruments will be discussed. The material will include ophthalmoscopes, retinal cameras, slit lamps, refractors and keratometers.

COURSE 177

Room 795 Period T-6

CARL CORDES JOHNSON, M.D.
Boston

Ptosis

The selection of the proper operation for a given case of ptosis is the theme of this course.

Ptosis will be classified into its various categories, with particular emphasis on congenital ptosis. The part played by associated anomalies will be stressed.

Various types of operations will be considered, with particular emphasis on the lecturer's method of levator resection as

done through a skin incision. The course will be illustrated by slides and a motion picture.

COURSE 178

Room 752 Period M-4

HAROLD H. JOY, M.D.
Syracuse, N. Y.

Chronic Glaucoma: Surgical Management

The object of this course is to present in a practical manner the indications and contraindications for surgical intervention, the proper choice of operation, the various standard techniques, the handling of operative and postoperative complications, and the procedures to be used when reoperation is necessary.

The dangers and disadvantages of surgical intervention are analyzed, as are the salient features which should determine whether or when an operation is indicated. Particular attention is paid to selecting a procedure which will best meet the needs of the case at hand with special reference to the condition of the chamber angle. The standard techniques are discussed in detail, including modifications, safety measures, complications, and reoperations.

COURSE 179

Room 796 Period M-6

KELVIN A. KASPER, M.D.
Philadelphia

Dacryocystorhinostomy

A modified version of the Mosher-Toti operation, which requires no suturing of the lacrimal sac to the nasal mucosa, will be demonstrated. The regional anatomy, the various structures encountered, the limits of safety, and the methods used to prevent later closure will all be considered. Preoperative preparation, exact technique of local anesthesia and postoperative care will also be outlined.

A film in color will show the entire operation. Enlarged paintings of the various steps will also be shown.

COURSE 180

Room 784 Period W-5

DEWEY KATZ, M.D.
Hartford, Conn.

Ophthalmic Anatomy: Clinical Significance and Application of Recent Advances

This course will be devoted to a presentation and discussion of recent advances in the realm of ocular anatomy and histology, the clinical significance of such advances, and the important clinical applications of some of the lesser known anatomic facts as well as a few of the well established ones. The anatomic basis for a number of clinical entities and the practical surgical import of some unusual anatomic facts will be discussed.

COURSE 181

Room 762 Period W-6

I. HERBERT KATZ, M.D.
Syracuse, N. Y.

Common Eye Diseases of Dogs and Their Therapy

The following points will be considered: (1) medicolegal aspects, including relationship of doctors of medicine and veterinarians; (2) external diseases, including injuries, melanotic keratitis, keratomalacia, ulcers and other corneal affections; (3) glaucoma, cataract, and fundus diseases.

Emphasis will be placed on the differences between human and dog conditions.

COURSE 182

Room 781 Period T-5

ROSCOE J. KENNEDY, M.D.
Cleveland

Ocular Manifestations of Systemic Diseases

Many systemic diseases have characteristic ocular manifestations and every ophthalmologist should be familiar with these for better recognition and handling of these cases. Any and all parts of the eye may be involved by many of these diseases.

The recognition of some of the more

common systemic diseases by their ocular manifestations will be discussed; e.g., hyperthyroidism, syphilis, tuberculosis, diabetes mellitus, blood dyscrasias, vascular occlusions.

Other less common diseases, such as lupus erythematosus, sarcoidosis, brucellosis, tularemia, myasthenia gravis, and Wilson's disease, will be reviewed.

Colored slides will be used to demonstrate the various manifestations.

COURSE 183

Room 744 Period Th-4

JOHN HARRY KING, JR., M.D.
Washington, D. C.

Lamellar Corneal Transplantation

Nonpenetrating keratoplasty is important to every ophthalmologist because of its wide applications in many aspects of corneal pathology. According to Magitot, this technique "can be used with success in 75 per cent of the cases where perforating keratoplasty is used today." It is a much safer procedure than penetrating transplantation and should therefore be preferred where benefit can be expected. The indications for its use will be discussed, including optical, preparatory, therapeutic, and miscellaneous. Methods of examination and diagnosis will be described. Surgical techniques, instrumentation, complications, postoperative care, and donor materials will be discussed. Emphasis will be placed upon the application of this method in the treatment of common corneal conditions. Colored slides and motion pictures will illustrate the lecture.

COURSE 184

Room 727 Period W-5

BERTHA A. KLIEN, M.D.
Chicago

Clinical Pathology of the Retina

The clinical manifestations of a diseased retina and pigment epithelium, and the pathogenesis of retinal disease in general will be discussed prior to a demonstration of the specific findings in a selected group of such diseases. Special emphasis will be placed upon the diagnosis of functional, inflammatory, and degenerative lesions of the macula lutea and on their differential diagnosis with relation to melanotic tumor, where this question arises.

COURSE 185

Room 795 Period M-6

ABRAHAM L. KORNZWEIG, M.D.
New York

Clinical Embryology

A study of the embryology of the eye has many practical values for the ophthalmologist. It enables him to understand the structure of the eyeball by seeing how it developed. This helps him to appreciate the functioning of the different parts of the globe. Above all, it aids in the differentiation of defects in the eye due to developmental and hereditary causes from those due to environmental conditions.

A series of slides will be shown demonstrating critical periods in the development of the human eye. Special attention will be given to abnormalities of the eye; congenital cataracts; congenital hydrophthalmos; typical colobomas of the iris, choroid, ciliary body and optic nerve; aniridia; microphthalmia; abnormalities of the optic disc; congenital defects in the retina; and retrolental fibroplasia.

COURSE 186

Room 705 Period W-6
or or
Room 727 Period Th-4

BERNARD KRONENBERG, M.D.
New York

Practical Ocular Therapeutics

This course will present therapeutic measures for the most common and frequent ocular problems. Diseases of the cornea, uvea, vitreous and retina will be discussed. The course will also delineate the limitations of our knowledge in the therapy of some of the baffling diseases. An attempt will be made to keep the discussion on a practical level.

COURSE 187

Room 736 Period W-6

PETER C. KRONFELD, M.D.
Chicago

Present Trends in Ocular Pharmacology

Clinical and laboratory studies in the field of ocular pharmacology have concerned themselves, during the last year, more with the mode of action of well-known drugs rather than with search for and the trial of new compounds. Combinations of outflow-improving and inflow-inhibiting drugs continue to be highly effective in the treatment of various glaucomas. Antifungal agents have come to the fore and yielded remarkable results in a few cases. The indications and contraindications for the use of steroids are becoming more sharply defined. Some of the recent lessons in pharmacology of the central nervous system may be advantageously applied to ocular pharmacology.

COURSE 188

Room 732 Period T-5

BRENDAN D. LEAHEY, M.D.
Lowell, Mass.

Corneal Transplantation

Practical points in preparatory surgery and therapy, operative techniques, and complications will be stressed, with special emphasis on current trends in graft fixation. The author's preplaced track suture method will be described. With this technique, silk sutures are inserted, running 1 mm. on each side of the trephine mark. These are stained with methylene blue and pulled through, leaving blue tracks for the subsequent direct sutures. Corresponding preplaced sutures are inserted in the graft with the aid of a plastic turret-style holder. For grafts up to 6 mm. in diameter, overlying sutures are also utilized.

The lecture will be illustrated by a series of eighty-five slides and a short motion picture, with sound, of one operation.

COURSE 189

Room 733 Period T-4 or W-4

PLACIDUS J. LEINFELDER, M.D.
Iowa City

Perimetry and Use of the Tangent Screen

A discussion of the relative values of perimetry and tangent screen in the examination of patients with neurologic diseases and glaucoma. Exceptions will be pointed out.

Description of the technique used for each method is given and the importance of the use of proper test objects is explained.

COURSE 190

Room 706 Period W-4

ROBERT W. LENNON, M.D.
Joliet, Ill.

Angle Closure Glaucoma: Therapy

The therapy of angle closure glaucoma will be divided into medical and surgical categories. Medical treatment will be discussed from the standpoint of local and oral medication. Special reference to the pharmacologic and physiologic actions of all the drugs employed in angle closure glaucoma will be made. Parasympathomimetic and sympathomimetic agents will be reviewed. Miotics will be classified and their physiologic action on the pupil described. A review of Diamox will be given, and this drug's role in treatment will be explained.

Surgical intervention in angle closure glaucoma will be discussed with special reference to the types of operations as well as to the timing of the procedures.

The lecture will be supplemented by the use of colored slides.

COURSE 191

Crystal Room Period T-5

IRVING H. LEOPOLD, M.D.
Philadelphia

Advances in Ophthalmic Therapy

As in the past years, each of the new therapies which have been tested and introduced during the past year will be presented and assessed to the extent allowed by presently available information and per-

sonal experience. Drugs will be considered under various categories, such as enzymes, antienzymes, autonomic agents, antibiotic substances and chemotherapeutic agents.

COURSE 192

Room 744 Period M-4

IRVING H. LEOPOLD, M.D.
Philadelphia
LEONARD APT, M.D.
Los Angeles

Chemotherapy

As in the past, new agents which have a possibility of affecting ocular disease and belonging to the category of chemotherapeutic compounds will be discussed. Particular attention will be paid to recently introduced compounds as well as those whose activities and useful areas have been altered by very recent experience. Chemotherapeutic agents employed for infections, neoplasms and inflammatory diseases will receive the major attention.

COURSE 193

Room 781 Period T-4

CECIL W. LEPARD, M.D.
Detroit

Eye Diseases Common to Children

Those ocular diseases occurring primarily in children constitute a group of special interest to the ophthalmologist, particularly when the method of examination or the differential diagnosis differs from that for those diseases in the adult. The technique and results of examination of premature infants will be discussed. The following syndromes will be discussed: neuroblastoma, chloroma, Schueller-Christian's disease, and eosinophilic granuloma. The discussion will be illustrated by lantern slides showing photomicrographs and findings in the eye and orbit.

COURSE 194

Room 726 Period T-6

IRVIN LEVY, M.D.
Trenton, N. J.

Practical Uses of Contact Lenses

Today contact lenses have more than hurdled the bridge of vanity into the realm of function. Every ophthalmologist must be aware of the indications for contact lenses. He should also be acquainted with the different makes and types of contact lenses. Whether he personally fits or does not fit contact lenses, he should be able to recognize the elements of a successful contact lens fitting. He should also be able to recognize the reasons for discomfort and failure in contact lens fitting. These fundamentals along with the technique of contact lens fitting will be discussed in this course.

COURSE 195

Room 726 Period W-6

J. EARL LEWIS
Chicago
BY INVITATION

Mechanical Visual Aids

A challenging opportunity to aid many patients who are plagued by subnormal vision awaits the alert ophthalmologist.

Intensive studies have been made in this field, with the result that greater help can now be given these patients than formerly. Various authorities estimate that approximately 60 per cent of these patients can be materially helped by low vision aids.

This includes many patients with retrolental fibroplasia who were formerly assigned to a school for the blind but who are now attending regular schools.

This subject will be fully discussed.

COURSE 196

Room 726 Period W-4

RALPH I. LLOYD, M.D.
Brooklyn

Fundus Lesions of the Senile Eye

A number of fundus conditions seen in the macular area of aging eyes have been rated as entities but are really stages of a

process resulting from the effects of time upon the elastic tissues of the lamina of Bruch and the choroidal vessels. The earliest phase is seen frequently in the eyes of older persons as an atrophy of the choroidal pigment exposing the sclerotic choroidal vessels. If the condition progresses, subretinal hemorrhages and exudate occur, with Coat's disease, disciform degeneration of the macula and angioid stripes as the final phase. Some of these lesions must be differentiated from metastatic lesions and tumor. As few of these eyes come to the laboratory, study of these lesions through the various stages is important.

COURSE 197

Room 740 Period Th-4

JOHN CHENAULT LONG, M.D.
Denver

Retinoblastoma and the Pseudoretinoblastomas: Differential Diagnosis

Familiarity with the clinical features of retinoblastoma will make it easier to differentiate between this and other confusing ocular disorders of childhood. The characteristics of retinoblastoma and the various pseudoretinoblastomas will be discussed. The technique of the diagnostic examination will be stressed. The aim of the presentation is to facilitate accurate diagnosis of these conditions by the clinician who sees them only infrequently.

COURSE 198

Room 795 Period W-6

VIRGINIA LUBKIN, M.D.
New York

Psychosomatic Aspects of Ophthalmology—1961

The breadth of the field compels the limitation of subject material for each session. This year emphasis will be on:

1. Review of recent developments, especially in glaucoma
2. Hypnosis as psychosomatic modality and its place in ophthalmology
3. Problems in visual perception and their relationship to clinical ophthalmology

COURSE 199

Room 724 Period M-4

ANGUS L. MacLEAN, M.D.
Baltimore

Cataracts: Surgical Management

This subject will be considered with respect to the preliminary examination, preoperative preparation, operative techniques, and postoperative care. The general preliminary examination, including necessary specific tests, and the detailed local examination of the eye will be outlined. Preoperative preparation for both general and local anesthesia will be discussed. Significant points in the operative technique will be considered for each type of cataract, including the use of a conjunctival flap as opposed to no flap; a new method of combining scleral lip cauterization with the extraction in chronic wide-angle glaucoma associated with cataract; and a method of extracting subluxated and completely luxated cataractous lenses. Postoperative care, from the time immediately following the operation to the final refraction and fitting with glasses, will be comprehensively discussed.

There will be a motion picture demonstration.

COURSE 200

Room 727 Period M-6

AUREL E. MANGOLD
New York

BY INVITATION

Proper Fitting of Glasses

This discussion will stress the following subjects:

1. The necessity of analyzing the prescription so that the finished glasses will give maximum comfort and efficiency
2. Anisometropic prescriptions and their effects on reading comfort
3. The importance of individual pupillary distance measurements
4. Lens form and its effect on visual comfort
5. The importance of vertex distance

6. The proper selection of bifocals in cases of hyperopia and myopia
7. Colored lenses
8. Zeiss, Kollmorgen and Feinbloom telescopic and microscopic systems
9. Methods of determining causes of patients' complaints with finished glasses
10. Suggested procedure for examination of a pair of glasses

COURSE 201

Room 712 Period W-4

MORTIMER MANN, M.D.
Indianapolis

Neurologic Disorders of Motility

This course will be concerned primarily with disturbances of conjugate gaze. The anatomy of the supranuclear centers and pathways which control conjugate movements will be described along with the neurophysiology of these structures. Supranuclear lesions which effect conjugate movements often produce characteristic disturbances of motility which may have considerable neurologic significance and localizing value. The signs and symptoms which indicate some impairment of conjugate gaze and associated neurologic findings will be discussed.

COURSE 202

Room 721 Period T-4

WILLIAM MANN, M.D.
Chicago

Interpretation of Functional Visual Impairment

Visual disturbances which are not organic in origin are encountered frequently by the ophthalmologist in private practice as well as by the industrial or military ophthalmologist.

It is important that functional visual impairment be differentiated from organic visual impairment. The recognition, basic etiology and treatment of various forms of functional disorders will be discussed. Hysteria and malingering should be differentiated. Though most of these patients are referred to a psychiatrist for treatment, the ophthalmologist should recognize what he can do in treating them.

COURSE 203

Room 713 Period Th-4

PAUL L. MARKS, M.D.
Baton Rouge, La.

Electrical Currents Used in Ophthalmology

An attempt will be made to explain the physical principles underlying the various electrical currents available to the ophthalmologist. An understanding of these principles will enable the surgeon to purchase his equipment more intelligently. What is more important, he will know what to expect following the use of various appliances. Among topics for discussion will be vacuum tube and spark gap circuits, high and low frequency currents, and cutting and coagulating currents. This will be correlated with the equipment that is now available for purchase.

COURSE 204

Room 727 Period W-6

DON MARSHALL, M.D.
Kalamazoo, Mich.

Differential Diagnosis and Treatment of Infections of the Lids

Infections of the lids and their management will be discussed, including differential diagnosis from simulating lesions. Emphasis will be on the clinical and practical aspects of the more common conditions. Conjunctivitis and lacrimal diseases will not be considered primarily. Some items covered will be blepharitis, meibomian infections, herpes simplex and zoster, vaccinia, Parinaud's syndrome, and fungus infections. Colored slides will illustrate many of these.

COURSE 205

Room 743 Period T-6

THEODORE G. MARTENS, M.D.
JOHN A. DYER, M.D.
Rochester, Minn.

Special Occupational Problems in the Presbyopic Patient

Comparative fitting time, wearing time, and subjective and objective effects of the various lenses will be discussed. Indications and contraindications for contact lenses will be presented.

COURSE 206

Room 781 — Period T-6

MALCOLM A. McCANNEL, M.D.
Minneapolis

Office Efficiency: Record Keeping and Gadgetry

The practical, clinical aspects of office layout, personnel efficiency and the hard facts of business administration are often thrust upon the man about to begin the practice of ophthalmology without much warning.

This course is pointed to the ophthalmologist about to open an office. It deals with such minutiae as the use of color, tips on office planning, practical, complete record keeping, a simplified, orderly examination procedural form, gadgets to aid in the refraction process, office communications, and similar matters which are important but are not discussed formally during an ophthalmology training program.

Emphasis will be placed on record keeping and a simplified method of recording clinical findings.

COURSE 207

Room 732 or Room 781 — Period T-6 or Period W-5

JAMES L. McGRAW, M.D.
Syracuse, N. Y.

Contact Lenses

In this course the relative merits of contact lenses as compared with spectacles will be presented. The advantages and disadvantages of the various types of contact lenses will be reviewed. Among the lenses to be discussed are the conventional fluid lens, the corneal lens, and the ventilated lens.

COURSE 208

Room 726 — Period W-5

WILLIAM P. McGUIRE, M.D.
Winchester, Va.

Cataract: Management of the Patient

This course is offered because it is felt that some discussion of the management of the patient with cataract will be helpful. Discussion of the various surgical procedures will be held to a minimum. The psychological approach to the problem, both in the preoperative and postoperative phases, will be emphasized. Problems in refraction encountered in the rehabilitation of the patient with aphakia will also be considered in some detail.

COURSE 209

Crystal Room — Period W-6

JOHN M. McLEAN, M.D.
New York

Selection of Surgical Procedures

COURSE 210

Room 712 — Period T-6

GEORGE R. MERRIAM, JR., M.D.
New York

Radiotherapy in Ophthalmology

The use of radiation in the treatment of ocular lesions will be discussed with particular emphasis on the late effects. The clinical course of the various diseases will be described briefly and the anticipated benefits of irradiation evaluated in terms of other therapeutic measures and the pos-

sible late sequelae. The discussion will be divided into three categories: superficial, low voltage, and high voltage therapy. The factors, dose, treatment time and technique of therapy will be described for each condition.

Superficial therapy will include both grenz ray and beta radiation and will cover treatment of such conditions as vernal catarrh, corneal vascularization, precancerous melanosis, recurrent pterygia, nodular episcleritis, phlyctenular keratitis, bullous and filamentary keratitis, and resistant corneal ulcers.

Low voltage therapy will comprise primarily the treatment of epithelization of the anterior chamber. A brief discussion will be given of the relative values of irradiation and surgery in the treatment of basal and squamous cell carcinomas of the lid.

High voltage therapy will cover such lesions as retinoblastoma, ocular lymphosarcoma, orbital hemangiomas and metastatic carcinoma to the eye or orbit.

COURSE 211

Room 777 Period T-5

W. HOWARD MORRISON, M.D.
Omaha

Glaucoma: Office Management

The control of glaucoma is largely an office procedure. Attention will be directed to the action of anti-glaucoma medications. Particular emphasis will be placed upon the use of miotics and aqueous secretory depressants. Drugs supplied by various pharmaceutical manufacturers will be listed, and their cost, stability, uniformity and availability contrasted with those compounded by the local pharmacy.

The rate and frequency of tonography, tonometry, gonioscopy, ophthalmoscopy, biomicroscopy, refraction and perimetry will be considered as well as the role of phasic variations in the management of the disease.

The value of office records, environmental problems and patient education will be discussed.

COURSE 212

Room 716 Period T-6

WILLIAM F. MURRAH, JR., M.D.
Memphis

Aids for Subnormal Vision: Clinical Evaluation

The author will list and classify the visual aids which he has used in improving the vision, either distance or near, of the patient whose best vision, aided or not aided by glasses, is poor and unsatisfactory.

Kodachrome slides will be used to show these various aids for subnormal vision, including telescopic and microscopic devices; and an evaluation and comparison of their physical characteristics and optical properties will be given along with how they may be used.

The amount of improvement found in the different grades of subnormally poor vision in a comprehensive series of patients following use of the various devices will be shown, and a frank and practical evaluation of these findings is presented.

COURSE 213

Room 712 Period T-4

HOWARD A. NAQUIN, M.D.
Baltimore

Dislocation of the Lens

Displacements of the lens will be reviewed from an etiologic and topographic point of view. The complications arising from displacements of the lens will be outlined and their treatment discussed. Special emphasis will be given to the problem of congenital dislocated lenses and arachnodactyly. Associated systemic and ocular abnormalities of this syndrome will be discussed. The indications for surgical intervention will be presented, and surgical technique will be discussed. Operative and nonoperative complications in a series of cases will be presented.

COURSE 214

Room 712 Period W-6

FRANK W. NEWELL, M.D.
and
SEYMOUR GOREN, M.D.
Chicago

BY INVITATION

Radioactive Isotopes in Ophthalmology

A brief description of the physical properties of radioactive isotopes useful in ophthalmology, and the factors involved in selection of an isotope for use in man or experimental animals will be presented. The use of compounds labeled with C_{14} and H_3 will be discussed, together with the use of isotopes in steady state studies, radioautographs, tumor localization, and ocular metabolism.

COURSE 215

Room 781 Period W-6

KENNETH N. OGLE, Ph.D.
Rochester, Minn.

Stereopsis: Present Concept

In this course the basic facts of stereoscopic vision will be considered. The topics discussed will include (1) relationship to general space perception, (2) retinal correspondence, (3) disparate images, (4) stereoscopic sensation, (5) stereoscopic acuity, (6) limitations as to both distance and disparity, (7) relationship to fusional movements, and (8) duration of stimuli. Also, some theoretical and practical aspects of stereopsis will be considered. Much of the material for the course will be based on the results of research over the past decade.

COURSE 216

Room 762 Period Th-4

KENNETH N. OGLE, Ph.D.
Rochester, Minn.

Binocular Oculomotor Coordination and Imbalances

The physiologic and neurologic components of the convergence processes, especially as related to the accommodation-convergence association, to fusion and fusional movements, and to the accommodative convergence and the proximal convergence, will be considered. Also discussed will be the phenomenon of fixation disparity and its use as a tool for studying oculomotor imbalances, especially when the eyes are subject to the stress of prism vergences and changes in the stimulus to accommodation. The data of representative cases will be presented.

COURSE 217

Room 784 Period Th-4

JAMES A. OLSON, M.D.
Detroit

Iritis, Iridocyclitis, Keratitis: Differential Diagnosis and Treatment

This course will present a review of the differential diagnostic points in nongranulomatous and granulomatous inflammations of the anterior uveal tract and the nonsuppurative inflammatory lesions of the cornea. Attention will be directed to the current methods of therapy, including the use of corticotropin (ACTH), cortisone, and hydrocortisone. The efficacy of the various methods of administering these agents, the dosages, and the problems of prolonged treatment and repeated treatment will be discussed. The use of antibiotics and the other supportive therapeutic measures in selected cases will be presented. Attention will be directed to the continued importance of careful physical examinations and the subsequent correction of possible causative focal defects of generalized disease processes.

COURSE 218

Room 740 Period T-5

R. TOWNLEY PATON, M.D.
Southampton, L. I., N. Y.

Corneal Surgery

The course will cover only the essential points in the following categories:

The indications for the various types of graft will be discussed in some detail with especial emphasis on the more recent uses of therapeutic lamellar grafts. Several new techniques which have been evolved for cutting of lamellar grafts will be illustrated

with slides. Slides will be used to show types of cases both favorable and unfavorable for surgery.

Preliminary preparation and postoperative care of the patient will be given some attention. Donor material will also be discussed.

COURSE 219

Room 721 Period W-5

HUBERT O. PAULSON, M.D.
Lincoln, Neb.

Lighting for Comfortable and Accurate Seeing

Illumination plays as important a part in correction of asthenopia as do refractions and orthoptics. Many industrial and home visual tasks can be accomplished much more efficiently and comfortably with proper illumination. The five requirements of illumination will be presented according to more recent standards. The proper use of fluorescent and incandescent sources of light will be discussed.

COURSE 220

Room 740 Period M-4

CHARLES A. PERERA, M.D.
New York

Retinal Detachment

Successful surgery in serous detachment of the retina depends upon a knowledge of the pathologic processes involved, the etiologic factors, the preoperative study of the patient, and the technique of operation. In addition to a discussion of these subjects, this course will deal with the prognosis as affected by preoperative and operative findings.

COURSE 221

Room 777 Period M-4

RAYMOND L. PFEIFFER, M.D.
IRA S. JONES, M.D.
New York

Roentgenography of the Eye and Orbit

Since the volume of material is great it is our intention to present each year homogeneous and complementary portions of the subject so that in time the entire material will be covered. This year fossae and smooth dehiscences of the orbital walls are presented.

When a structure is present early in life around which the orbital bones must mold themselves then a fossa or a dehiscence with this kind of lesion is the orbital dermoid cyst in which the fossa may lie in the bone or may extend all the way through the bone as a dehiscence. In a like manner congenital rests of the lacrimal gland often associated with benign mixed tumors show a fossa in the lacrimal region. Roentgenograms of encephaloceles belong to this same general group. The diagnostic features as well as the differential diagnosis will be discussed.

COURSE 222

Room 726 Period T-5

GUILLERMO PICO, M.D.
Santurce, Puerto Rico

Dacryocystorhinostomy

A technique of external dacryocystorhinostomy which has been found simple, safe and successful will be described in detail. Kodachrome slides and a motion picture in color will illustrate the steps of this operation. The almost complete absence of bleeding is one of its most desirable features.

Important aspects in the regional anatomy will be demonstrated. Indications for dacryocystorhinostomy, preoperative preparation, anesthesia and postoperative care will be discussed.

A short review of the evolution of external dacryocystorhinostomy will be presented.

COURSE 223

Room 750 Period Th-4

M. HAYWARD POST, JR., M.D.
St. Louis

Refinements of Refraction: Methods and Measures for Meeting the Problems Encountered

This course will deal strictly with the practical problems of refraction as they have been met by the director during more than forty years' experience, rather than with the underlying mathematical or optical principles. The problems of motility will be mentioned, such as those of vertical and horizontal imbalance, and suggestions made for their control, but the formulas and tables used in these corrections will not be described in detail, as has been done in past years.

The proper positioning of lenses before the eye will be emphasized, especially in considering high-power lenses.

In this connection, the handling of the patient with incipient and progressing cataract will be studied in some detail. Postoperative cataract cases will also be studied in detail, both monocular, with a good or bad unoperated eye, and also binocular aphakics. It should be emphasized here that no cataract operation is completed until a careful refraction has been done and the patient equipped with those lenses which will give the greatest satisfaction. These may be simple meniscus, panoptik, or similar lenses, or, in many cases, contact lenses, but never biconvex.

The handling of young hyperopes and, more particularly, young myopes, will be studied. The latter are much more easily consoled in explaining their difficulty since the introduction of the modern contact lenses.

The proper procedures for the management of anisometropia, including the use of aniseikonic correction, will also be considered. And in this connection, further consideration of the value of the modern contact lens and its immediate, though temporary, effect upon astigmatism will be pointed out.

How the ophthalmologist should work with the orthoptic technician often presents other problems for consideration, which will be discussed.

Finally, there will be a short reference to some of the psychological complications that often are found, leading to serious, and sometimes amusing, complications.

Good refraction is a complicated and delicate matter. Minor errors will often cause more trouble than major ones. If you are of those who believe that any refraction can be done in five minutes, this course is not for you.

COURSE 224

Room 740 Period W-5

ALBERT M. POTTS, M.D.
Chicago

Ophthalmic Toxicology: Part I, The Local Action of Toxic Substances

Because of the relatively small size of the exposed surface of the eye and the unique requirement for preservation of transparency, chemical insults which would have negligible effect on other parts of the body can be catastrophic for the eye.

Detailed discussion of the clinical effects of acids, bases, organic solvents, surface active agents, and vesicants will be presented. Methods of rational therapy for each of the above will be presented.

It is intended to present the subject of Ophthalmic Toxicology as a three-year sequence, of which this is part I.

COURSE 225

Crystal Room Period M-5

ALGERNON B. REESE, M.D.
New York

Cataract Extraction

There will be a general discussion of the subject from various aspects which the author feels need emphasis. These include the cause and control of vitreous pressure; the recognition and handling of deviations from the usual at the time of extraction; the diagnosis, as well as combating untoward occurrences, early and late, in the postoperative courses; the cause and treatment of poor postoperative vision; and postoperative glaucoma. Adequate time will be devoted to a discussion of the operation for congenital cataract.

COURSE 226

Room 786 Period T-4

ELLEN F. REGAN, M.D.
New York

Cataract Surgery: Complications Due to Defective Wound Healing

Delayed restoration of the anterior chamber, late fistulization, epithelization of the anterior chamber and secondary glaucoma are complications of cataract surgery which may be attributed to faulty healing of the cataract incision. The clinical and pathologic aspects of these conditions will be discussed. Emphasis will be placed upon the prevention and treatment of these conditions.

COURSE 227

Room 762 Period T-6

A. BENEDICT RIZZUTI, M.D.
Brooklyn

Tumors of the Lids and Ocular Adnexa

This course is intended to stress the highlights in the clinical diagnosis and methods of therapy, both medical and surgical, of a variety of tumors that can affect the lids, the conjunctiva, the lacrimal system, and the orbit. The grouping of the neoplasms will be mainly discussed according to their histologic classification.

A large number of colored tranparencies will be projected to illustrate the salient clinical and pathologic features. Radiation therapy and ancillary subjects of particular interest to the ophthalmologist will be briefly discussed.

COURSE 228

Room 734 Period Th-4

WILLIAM RUBIN, M.D.
New Brunswick, N. J.

Aims in the Management of Squint

I. Satisfactory cosmetic results including good ocular rotations in all fields of gaze

II. Functional improvement

A. Elimination of amblyopia

1. Detection of small and large degrees of eccentric fixation
2. Detection of anomalous retinal correspondence
3. Treatment by (a) occlusion of good eye; (b) occlusion of squinting eye with subsequent stimulation of the fovea and inhibition of the parafoveal regions by *pleoptics*

B. Development of binocular single vision and fusion

1. Correction of obstacles to fusion
2. Miotics and cycloplegics
3. Prisms
4. Establishing alternate fixation, an important requirement for strabismus surgery

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COURSE 229

Room 752 Period T-4

A. D. RUEDEMANN, JR., M.D.
Detroit

The Differential Diagnosis and Surgical Correction of Vertical Muscle Defects

This course will deal with the various vertical muscle problems, their differential diagnosis and surgical correction. The course will describe a selection of muscle problems and their treatment.

COURSE 230

Room 781 Period M-5

WALTER Z. RUNDLES, SR., M.D.
Flint, Mich.

Streak Retinoscopy

COURSE 231

Room 728 Period M-4

RALPH O. RYCHENER, M.D.
Memphis

The Lacrimal Apparatus

This course will present a general review of the lacrimal apparatus, with special emphasis on the treatment of some of the minor but rather troublesome phases encountered in private practice, as well as the more dramatic and quite satisfactory methods of tear sac surgery. The office management of congenital stenosis and the more popular techniques of dacryocystorhinostomy will be fully illustrated with slides.

COURSE 232

Room 702 Period T-6

ALEJANDRO SALLERAS, M.D.
Buenos Aires, Argentina

BY INVITATION

Corneal Surgery

Emphasis will be on practical points of corneal surgery. The author will describe his own technique and the instruments he uses.

The major part of the course will be devoted to a discussion of corneal grafts. Topics under consideration will be the indications for and prognosis of corneal graft; donor material and operative accidents; normal postoperative course and postoperative complications of penetrating and lamellar grafts; results of both types of grafts and retransplants.

Two advanced surgical procedures — plastic corneas, and refractive surgery of the cornea — will be given brief comment.

The indications, complications and results of corneal grafts will be illustrated with photographs of the anterior segment. Colored motion pictures will illustrate the techniques of penetrating and lamellar graft, use of plastic corneas and Barraquer's method of grinding frozen corneas to modify the eye's refraction.

COURSE 233

Room 777 Period T-6

S. LAWRENCE SAMUELS, M.D.
Plainfield, N. J.

Pathological Sections for the Clinician

The lecturer aims to show the correlation between the pathological sections and the clinical findings. The course is not intended as an intensive course in histopathology, but rather as an open-end stimulus to think in pathological terms. Imagine a sagittal section of the eye when looking through the slit lamp and the ophthalmoscope.

Pathological sections will illustrate the more common abnormal conditions found in enucleated eyes. Clinical pathology answers the question, "What sequence of events led to enucleation of this eye?" The history will be given and the clinical and pathological diagnosis will be compared.

COURSE 234

Room 706 Period T-6

J. ALBERT SARRAIL, M.D.
San Francisco

Plastic Lid Surgery

The course is designed for those who wish to review the fundamentals of lid surgery. The following topics will be covered:

I. Tarsorrhaphy, temporary and permanent

II. Traumatic lesions
   a. Repair of lid borders to prevent lid notching
   b. repair of canthal ligaments with involvement of canaliculi
   c. Correction of displaced internal and external canthi

III. Entropion — Butler procedure

IV. Ectropion — paralytic (Kuhnt-Szymanowski operation)

V. Ptosis

a. Modified Blaskovics procedure with partial acting levator

b. Modified Reese procedure with complete ptosis

The lecture will be illustrated with a motion picture and slides.

COURSE 235

Room 781 Period M-4

HERMAN D. SCARNEY, M.D.
Detroit

Slit Lamp Biomicroscopy: Its Value in Office Diagnosis

The expensive initial investment in a biomicroscope, which has come to be recognized as an indispensable part of the examining equipment of the clinical ophthalmologist, can return many dividends in accuracy of diagnosis and prognosis, and in indications of possible procedure in treatment afforded by no other means.

The value of routine biomicroscopy in office diagnosis will be emphasized by presenting a series of kodachrome slides illustrating fairly common lesions of the lids, conjunctiva, cornea, anterior chamber, iris and lens. Biomicroscopy of the fundus with the Hruby lens will also be discussed.

COURSE 236

Crystal Room Period M-4

HAROLD G. SCHEIE, M.D.
Philadelphia

Congenital Glaucoma: Surgical Procedures

The surgical treatment of juvenile and infantile glaucoma will be discussed. The development of goniopuncture and the results obtained with this treatment in cases of juvenile glaucoma will be presented. The author's method of goniotomy for infantile glaucoma will be illustrated by slides and a motion picture. An analysis of the results obtained from goniotomy, goniopuncture, and a combination of the two will be made.

COURSE 237

CANCELLED

COURSE 238

Room 743 Period Th-4

JAMES S. SHIPMAN, M.D.
Camden, N. J.

Retinal Detachment Surgery: Simple Retinoplexy and Scleral Resection vs. Enfolding

1. Review of history of various methods of retinal repair (with slides)

2. Simple retinopathy; indications and technique, with emphasis being made on necessity for doing this procedure early, in preference to more complicated procedures later (with slides)

3. Technique for usual resection—lamellar rather than complete:
   a. The position, size of and shape of the area on the sclera to be resected
   b. The technique of this procedure (illustrated with slides)
   c. Discussion of various tubes, plates, etc. (with slides)

4. Detailed illustrations with slides and motion picture of enfolding procedure as advocated by instructor, with reasons and indications for same. Questions and answers

COURSE 239

Room 793 Period W-6

JOHN T. SIMONTON, M.D.
Rye, N. Y.

Orbital Surgery

The surgical anatomy of the orbit will be reviewed.

The value of careful preoperative work-up will be emphasized, stressing the importance of teamwork between the ophthalmologist and the radiologist, otolaryngologist, neurosurgeon, internist and pathologist.

The rationale for exploration of the orbit in the presence of unexplained progressive proptosis will be mentioned.

Various surgical approaches to the orbit will be discussed and demonstrated by means of kodachrome slides and motion pictures.

COURSE 240

Room 744 Period M-5

G. VICTOR SIMPSON, M.D.
Washington, D. C.

Hemorrhage into the Vitreous: Diagnosis and Management

Hemorrhage into the vitreous is frequently the initial sign of a serious systemic or local eye disease. It is with the diagnosis and management of vitreous hemorrhage in such circumstances that this course is concerned.

Massive hemorrhage into the vitreous is readily recognized, but the blurring of vision from a mild hemorrhage must be distinguished from (1) rupture of a peripheral retinal cyst, (2) separation of a rosette from the peripheral retina, (3) rupture of the posterior hyaloid from its attachment at the optic nerve, and (4) subacute uveitis. The points of differentiation will be discussed.

The exact cause of the hemorrhage must be quickly ascertained. The investigations and eye examinations necessary to reach an etiological diagnosis will also be discussed.

Treatment to aid absorption of blood from the vitreous, and specific treatment, when available, to prevent recurrences will be discussed during the hour.

COURSE 241

Room 721 Period T-5

BYRON SMITH, M.D.
New York

Fractures of the Orbit

In conjunction with a review of the practical anatomy of the orbit, a classification of orbital fractures will be discussed.

Symptomatology and differential diagnosis will be coordinated with roentgenographic interpretation. Slides and movie films will be projected for illustration of various forms of treatment. The management of post-traumatic complications, such as dacryostenosis, heterotropia, diplopia, enophthalmos and other deformities, will be discussed and evaluated.

COURSE 242

Room 740 Period T-4

J. LAWTON SMITH, M.D.
Durham, N. C.

Neuro-ophthalmology

I. Ophthalmodynamometry and Cerebrovascular Disease
   1. Premonitory symptoms of cerebrovascular insufficiency
   2. Amaurosis fugax
   3. Techniques of ophthalmodynamometry
   4. Indications for ophthalmodynamometry
   5. Ocular bruits
   6. Therapy

II. Optokinetic Nystagmus
   1. Techniques
   2. Uses
   3. Clinical interpretation

III. Topical Diagnosis of Third Nerve Palsies

The localizing value of the eight anatomical syndromes of the third nerve will be discussed.

IV. Ocular Manifestations of the Pierre Robin Syndrome
Severe ocular disease may be encountered in the Pierre Robin syndrome (microagnathia, cleft palate, and glossoptosis). The ocular defects found in 30 cases with microagnathia will be reviewed.

COURSE 243

Room 713 Period W-4

EDMUND B. SPAETH, M.D.
Philadelphia

The Surgery of Horizontal Duction Defects

A large number of cases with an abduction defect are due to a congenital or an acquired sixth nerve paralysis. Similarly, adduction defects are the result of a complete or subtotal third nerve paralysis. There are several types of these adduction involvements, which may be nuclear in origin or due to peripheral orbital nerve disease. Other conditions of a developmental nature are also present with a horizontal duction involvement. The retraction syndrome, and the various forms of strabismus fixus are examples of this variety, involvements in adduction as well as abduction.

The course is a discussion of the anatomical changes in these conditions and the surgical procedures necessary for their correction.

COURSE 244

Room 702 Period T-4

EDMUND B. SPAETH, M.D.
Philadelphia

Complicated Ptosis

Congenital ptosis in a large percentage of cases is complicated by conditions other than the drooping lid. These are vertical and horizontal muscle paralyses, concomitant and paralytic strabismus, and various types and degrees of epicanthus. Acquired ptosis is not always a surgical condition. These cases, when surgical, frequently have other complicating oculomotor and plastic defects.

A consideration of ptosis surgery, as well as a discussion of those procedures necessary for correction of the complicating and accompanying conditions, is the subject matter for this course.

COURSE 245

Room 740 Period M-5

PHILIP G. SPAETH, M.D.
Philadelphia

PAUL L. CARMICHAEL, M.D.
Lansdale, Pa.

Ocular Tumors: Differential Diagnosis and Treatment

A classification of tumors of the globe, including cornea, uveal tract, retina, and optic nerve, as well as metastatic lesions, will be given.

There will be emphasis on the multiple facets of diagnosis including ophthalmoscopy, binocular ophthalmoscopy, biomicroscopy, transillumination, campimetry, x-ray, and radioactive isotopes.

The practical application of radioactive isotopes in the diagnosis of intraocular and extraocular lesions will be discussed with relationship to type of lesions, age of patient, and interpretation of the tests.

A discussion of therapy, including radiotherapy, chemotherapy, diathermy, surgery, light coagulation, and expectant treatment will be included.

COURSE 246

Room 731 Period W-4

H. SAUL SUGAR, M.D.
Detroit

Classifications of Glaucoma

The classification of glaucoma as used by von Graefe has been changed by the newer concepts of chamber angle depth. The classification presented is a suggested etiologic one, although we know full well that our information is incomplete in this regard. Examples of the various secondary glaucomas will be shown.

COURSE 247

Room 724 Period T-6

FREDERICK P. SUTLIFF, M.D.
Philadelphia

Practical Fitting of Corneal Lenses

The method for the fitting and prescribing of corneal contact lenses will be presented. The indications and contraindications, including patient selection, will be discussed. The method of refraction, measurement of the cornea, and ophthalmometry will be outlined. The writing of prescriptions from this information will be demonstrated. Instructions to patients on insertion and removal of corneal lenses and wearing-time schedules will be presented. The management of the patient's problems and follow-up visits will be discussed.

COURSE 248

Room 784 Period W-6

EDWIN C. TAIT, M.D.
Norristown, Pa.

Heterophoric Asthenopia: Evaluation and Treatment

Surgery is sometimes indicated in the treatment of heterophoric asthenopia, and it is the problem of the physician to decide when surgical intervention is necessary and when it is not.

In this course a usable classification of horizontal heterophoric anomalies with parallel methods of treatment will be presented.

The most widely used classification today is the Duane-White classification, which, with minor variation, is the same as it was when introduced by Duane before the turn of the century.

The discussion will show the difficulties encountered in using the Duane-White classification and will present a more readily usable classification.

COURSE 249

Room 732 Period M-6

I. S. TASSMAN, M.D.
Philadelphia

Eye Involvement in Systemic Diseases

Many of the systemic diseases may either cause or be accompanied by an eye disorder. Such diseases may be classified as congenital, hereditary, heredofamilial and acquired. In a number of instances the eye condition may be quite severe and should be cared for by an ophthalmologist.

There are a number of these conditions which are of great importance to the ophthalmologist and these will be presented with illustrations and discussed in detail.

COURSE 250

Room 734 Period M-6

FREDERICK H. THEODORE, M.D.
New York

Ocular Therapeutics

An appreciation of the potentialities and the limitations of the agents at our disposal is a prerequisite for effective therapy. Many new and potent drugs are now widely used in ocular therapeutics. Valuable as they are, their introduction has posed the dangers from injudicious use, in addition to other therapeutic problems.

The course offers a practical clinical approach to the treatment of external diseases of the eye, with a critical evaluation of those drugs, both old and new, currently used for this purpose. The action of the drugs, indications and specific contraindications for their use, the capricious behavior and unreliability of some of them, and methods for their application will be considered in detail. The importance of vehicles in general, the choice of appropriate ones, and specific problems and dangers inherent in the prescribing of ophthalmic drugs will be stressed. The necessity for differentiating drug reactions due to allergy from drug reactions due to irritations will be discussed from the therapeutic point of view. General principles concerning the treatment of ocular eczemas will be outlined. The entire lecture will be illustrated by kodachrome slides of clinical cases.

COURSE 251

Room 793 Period Th-4

ROBERT I. TRENT, M.D.
Oklahoma City

Progress in Ophthalmology: Therapy, Including Psychotherapy

The following topics will be discussed:

1. Angiospastic retinopathy and macular edema: etiology; treatment
2. Corneal epithelial erosion: etiology; special form of determination
3. Ocular migraine: etiology; treatment
4. Blepharospasm in children: a successful treatment
5. Ocular degeneration: management including treatment of senile macular form
6. Incipient cataract and/or glaucoma exceptional treatment
7. Care by assistants or associates supplementary to surgical operation
8. Approach of the ophthalmologist to the first visit of the very young child
9. Reading difficulties: their treatment in children of all ages
10. Preparing children and adults for wearing various types of glasses, including contact lenses

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COURSE 252

Room 736 Period T-6

STANLEY M. TRUHLSEN, M.D.
Omaha

Home Orthoptics

The ophthalmologist who does not have an orthoptic technician can make use of many simple and practical devices to stimulate and improve the fusional process.

This course will discuss the home treatment of amblyopia and suppression and will present orthoptic tools and methods that can be used by patients in their homes and on their own time.

Emphasis will be given to the simpler and inexpensive methods and devices used by orthoptic technicians. The uses, advantages and disadvantages of some of the commercially available instruments will be discussed.

COURSE 253

Room 716 Period T-5
or or
Room 724 Period W-6

ALFRED UIHLEIN, M.D.
FRED KERR, M.D.
Rochester, Minn.

BY INVITATION

Management of Head and Face Pain

Most of the pain about the head and face can be outlined along definite nerve pathways. The most logical treatment is to eradicate the cause, but all too frequently this is impossible. Neuralgia should be distinguished from neuritis. The former is a sharp, intermittent pain along the distribution of a given nerve. Neuritis, on the other hand, produces pain that is continuous and lancinating and frequently is accompanied by tenderness, paresthesia or anesthesia; motor paralysis is present if a mixed nerve is involved. For simplicity in diagnosis and treatment, the neuralgias of the head can be divided into minor and major types. The diagnosis and treatment of facial pain in relation to the major and minor neuralgias will be reviewed and illustrated by slides.

COURSE 254

Crystal Room Period T-6

DERRICK VAIL, M.D.
Chicago

Senile Cataract: Mechanical Factors of Surgery

A short description of the origin and insertion of the zonular membrane will be given. This is the keystone in the problem of cataract extraction. Mechanical factors involved in the operation, with and without alpha-chymotrypsin will be stressed. Necessary modifications of the standard operation when zonulolysis is utilized will be described, and the problems it creates will be discussed.

COURSE 255

Room 702 Period M-6

EVERETT R. VEIRS, M.D.
Temple, Texas

External Dacryocystorhinostomy and Corrective Procedures for Epiphora

The diagnosis and treatment of lacrimal disorders will be presented.

External dacryocystorhinostomy will be described in detail and will be illustrated by a motion picture and lecture slides.

The causes and correction of epiphora in the various age groups will be discussed. Corrective procedures will be illustrated, particularly stressing epiphora in the aged.

A new procedure for repairing severed canaliculi will be described in detail.

COURSE 256

Room 740 Period W-4

SAMSON WEINGEIST, M.D.
Long Island City, N. Y.

Lacrimal Sac Surgery

Surgical operations on the lacrimal sac, particularly dacryocystorhinostomy ab externo, will be discussed step by step, stressing correct anesthesia, local or general, proper illumination of the operative field, simple instrumentation and hemostasis. An easy way to procure a large bony window (dealing with ethmoid cells, if encountered) in order to secure permanent drainage will be outlined. The simple placement of posterior and anterior sutures to anastomose the nasal mucosa with the lacrimal sac will be shown. This procedure will be compared with intubation procedures. Adequate probing and x-ray visualization will be mentioned.

Indications, contraindications, complications, reoperations and alternate operations will be discussed.

Emphasis will be placed on the simplification of the difficulties that many general ophthalmologists encounter.

Slides and a film in color will be shown.

COURSE 257

Room 781 Period M-6

C. WILLIAM WEISSER, M.D.
Pittsburgh

Repair of Corneal Injuries

Improved instruments, techniques and medications for care of superficial or deep corneal damage will be covered. General and specific care of infections, contusions, abrasions, ulcers, burns, lacerations with and without iris prolapse will be reviewed. Complications such as hyphema, hypopyon, visual disturbances will be outlined and their management discussed.

More detailed discussion and slide presentation will be presented of some cases such as those with prolapsed iris and lens damage. More complete review of patients treated with fibrin film will be made. Office, laboratory and hospital needs will be commented upon. Photographs of interesting cases will be shown.

COURSE 258

Room 731 Period M-6

JOHN P. WENDLAND, M.D.
Minneapolis

Magnetic Intraocular Foreign Bodies

Magnetic intraocular foreign bodies will be discussed under the following headings: (1) diagnosis, (2) localization, (3) preoperative treatment, (4) surgical approach, (5) complications, and (6) postoperative treatment. Particular stress will be placed upon the use of the Berman locator and its new curved probe in the localization of these intraocular foreign bodies during surgical procedures, and upon the techniques for removal of these foreign bodies in different locations in the globe.

Slides and a motion picture will illustrate the discussion.

COURSE 259

Room 743 Period W-6

HORACE L. WESTON, M.D.
Detroit

Astigmatism: Clinical Measurement

The various methods of measuring astigmatism depend upon two simple optical principles. An examiner who understands these principles can use several astigmatism tests with facility and will find that he is better prepared both to handle problem cases and to verify his findings by counterchecking.

In this course the effect of obliquely crossed cylinders will be discussed in relation to the determination of the astigmatic axis by the retinoscope, cross cylinder, and astigmatic dial. The proper manipulation of the astigmatic conoid of Sturm will be shown to be the basis for measuring the amount of astigmatism by each of these methods.

COURSE 260

Room 726 Period T-4

EVERET H. WOOD, M.D.
Albuquerque, N. M.

Macular Lesions: Early Diagnosis and Treatment

The course will consist of a brief review of the embryology, anatomy and physiology of the macular region, followed by a discussion of the early diagnosis and treatment of various conditions of the macula with special emphasis upon macular disease in the aging individual. Methods of treatment and management of various retinal lesions will be discussed in detail, and the course will be illustrated by a series of slides and tables.

COURSE 261

Room 706 Period T-4

CHARLES A. YOUNG, JR., M.D.
Roanoke, Va.

JOSEPH M. DIXON, M.D.
Birmingham, Ala.

Contact Lenses

Instruments and materials needed, step-by-step procedure, advice to the patient, complications encountered, and results to be expected are all considered. Special emphasis will be given to the examination of the contact lens to determine whether it has been correctly fabricated in every way. A brief survey of some recent experimental studies will be made.

CONTINUOUS COURSES — OTOLARYNGOLOGY

1961

COURSE 301

Room 744 Periods Th-1, Th-2

JACK R. ANDERSON, M.D.
New Orleans, La.
JESSE FUCHS, M.D.
Beverly Hills
A. GILBERT SILVER, M.D.
New York
IRA J. TRESLEY, M.D.
Chicago

Rhinoplasty: Question and Answer Panel

A two-period course—$4.00

This course is designed for discussion of the problems of those who have had some experience in rhinoplastic surgery.

The members of the panel have been selected from different sections of the country so that answers to inquiries might reflect a broad scope of opinion. Each panelist will be asked to comment briefly on every question. The keynote of the course will be practicality.

Those attending are asked to prepare written questions in advance, although questions from the floor will be welcome. Preoperative and postoperative photographs may be submitted for opinions and comments.

COURSE 302

Room 728 Periods Th-1, Th-2

SHIRLEY HAROLD BARON, M.D.
San Francisco

Tympanoplastic Procedures: Evaluation of the Advantages and Pitfalls

A two-period course—$4.00

A basic concept of tympanoplasty with Wullstein's classification will be reviewed, and Professor Wullstein's motion picture illustrating each procedure will be shown. This will be followed by a discussion of experiences with these techniques and an attempt to relate their advantages and pitfalls. Certain variations, including the use of prostheses, will be presented.

COURSE 303

Room 734 Periods T-1, T-2

COURSE 304

Room 734 Periods W-1, W-2

JOHN J. CONLEY, M.D.
and
MAURICE LENZ, M.D.

BY INVITATION
New York

Carcinoma of the Head and Neck: Diagnosis and Treatment

A two-period course—$4.00

This two-hour course is being presented twice, as Course 303 on Tuesday and as Course 304 on Wednesday. **Please select course number according to day on which you wish to attend.**

The course includes an analysis of cancers involving all the major systems of the head and neck area: the various types of malignant tumors involving the epithelium, sinuses, ears, lips, tongue, buccal mucosa, palate, nasopharynx, floor of the mouth, hypopharynx, parotid gland, cervical lymphatics, thyroid gland and cervical esophagus (larynx intentionally omitted because of its inclusion in other courses).

A discussion of the diagnosis of these malignant tumors will be based on the pertinent factors in the history, physical examination, roentgenograms, chemical tests, and various biopsy techniques relative to each case.

Emphasis will be placed on the use of supervoltage in the treatment of malignant tumors of the head and neck.

A discussion of treatment will include the curative effects of various types of surgery and irradiation and combinations of these two techniques. It will also include the worthwhile palliative efforts in the management of incurable cancer by surgery, irradiation or combinations of these techniques.

COURSE 305

Room 796 Periods T-2, T-3

JOHN MARQUIS CONVERSE, M.D.
New York

Principles of Corrective Nasal Plastic Surgery

A two-period course—$4.00

This course reviews the basic anatomic, physiologic and surgical principles in corrective surgery of the external nose and of the nasal septum. The application of these principles is essential in rhinoplasty. In addition to the typical rhinoplastic operation, the problems of the deviated nose and septum and also of cartilage and bone grafting are discussed.

COURSE 306

Room 721 Periods T-2, T-3

MEYER S. FOX, M.D.
Milwaukee

ARAM GLORIG, M.D.
Los Angeles

Noise in Industry: Progress and Recent Developments

A two-period course—$4.00

Topics for Discussion

1. Results and practical applications of recent research and industrial studies
2. What is meant by "noise exposure"?
3. Medical aspects of noise induced hearing loss
4. Guide for determination of hearing impairment as recommended by the Committee on Conservation of Hearing of the American Academy of Ophthalmology and Otolaryngology (TRANSACTIONS, March-April 1959)
5. The role of the otolaryngologist in medical legal aspects of hearing loss claims
6. Recommended hearing conservation programs for industry

This course has been planned for otolaryngologists who are actively engaged in hearing conservation programs in industry and for any others who are interested in the industrial noise problem. The presentation will consist of an informal panel discussion by the members of the Subcommittee on Noise who have been very active in the field of industrial noise. Emphasis will be placed upon practical measures and a realistic approach to the problem. The presentation will be supplemented by charts, slides and motion pictures taken from actual industrial situations.

COURSE 307

Room 712 Periods T-2, T-3

Z. Z. GODLOWSKI, M.D.
Chicago
BY INVITATION

I. Physiopathology of the Endocrine System

II. Enzymatic Mechanism of Allergy

A two-period course—$4.00

I

1. Relationship of hypothalamus to autonomic nervous system, endocrine glands and target cells
2. Primary and secondary endocrine disorder: therapeutic and diagnostic importance
3. Strategic position of anterior pituitary lobe and thyroid gland in clinical symptomatology
4. Questions and answers

II

1. Enzymes, their action and their relationship to hormones
2. Enzymatic diseases: enzymatic mechanism of allergy
3. Self-termination of allergic reactions, desensitization by low-dosage method of antigen as seen in enzymatic mechanism of allergy
4. Practical conclusions in antiallergic therapy in office practice based on enzymatic mechanism of allergy
5. Questions and answers

COURSE 308

Room 712 Periods Th-2, Th-3

Z. Z. GODLOWSKI, M.D.
Chicago

BY INVITATION

Endocrinopathies: Management of Subclinical and Clinical Forms in Office Practice

A two-period course—$4.00

Diagnosis

1. Diagnostic evaluation by physical examination
2. Choice of laboratory tests and their interpretations
3. Questions and answers

Therapy

1. Advantages and disadvantages of "single" and "multiple" therapeutic agents
2. Etiologic therapy in hormonal disorders
3. Substitution therapy in hormonal disorders
4. Antiphlogistic value of adrenocortical steroids
5. Adjustment of emotional disorders in hormonal disorders related to allergic reactions
6. Questions and answers

COURSE 309

Room 722 Periods W-1, W-2

FREDERICK R. GUILFORD, M.D.
WILLIAM K. WRIGHT, M.D.
Houston, Texas

Techniques of Tympanoplasty

A two-period course—$4.00

It is our purpose to discuss the various techniques of tympanoplasty. The discussion will include criteria for the selection of candidates, preoperative care, application of the various techniques during surgery, postoperative care, and operative and postoperative problems encountered.

Physiology of the middle ear conduction mechanism as applied to the various types of tympanoplasty will be reviewed. Our results with the various types of tympanoplasty will be discussed.

Slides and a motion picture will be used as instruction aids.

COURSE 310

Room 706 Periods T-2, T-3

FRENCH K. HANSEL, M.D.
St. Louis

Allergy and Medical Otolaryngology

A two-period course—$4.00

The problems of medical otolaryngology are varied, multiple and ever changing. In many instances the indications for surgical interference must be evaluated only after medical treatment and observation. The management of the patient, therefore, is directed to the consideration of disease and loss of function which affect the ears, nose and throat, and related structures. These problems concern allergy, infection, immunity, anemia, malnutrition, dental caries, effects of tobacco and alcohol, endocrine deficiencies, loss of function as manifested by vascular headaches, vertigo and tinnitus, deafness, psychosomatic disturbances and other related conditions.

COURSE 311

Room 711 Periods T-1, T-2

FRED HARBERT, M.D.
Philadelphia

Clinical Audiology

A two-period course—$4.00

The diagnosis of hearing defects will be considered on the basis of findings which indicate the site, type, and degree of pathologic change in the conductive mechanism, inner ear (hair cell), and nerve. Audiologic differences in conductive lesions due to mass, stiffness, and phase will be discussed and illustrated by case findings. Different varieties of recruitment will be defined and illustrated.

The basic principles of masking and cross masking will be outlined and newer methods of masking, such as narrow band and Rainville techniques, will be described and evaluated. Bone conduction problems will be stressed, especially from the standpoint of their surgical significance.

Tests for and interpretation of pathological adaption utilizing Bekesy and conventional audiometry will be described.

To facilitate this presentation, it is suggested that the background information contained in the course brochure be read *before* attending.

COURSE 312

Room 712 Periods W-2, W-3

WILLIAM G. HARDY, Ph.D.
MIRIAM PAULS HARDY, Ph.D.
Baltimore

BY INVITATION

Clinical Audiology for Children

A two-period course—$4.00

With infants and preschool children, particularly those with delayed speech, special techniques must be used to evaluate the hearing function and its relation to the child's development and behavior. Several techniques (employing calibrated toys and noise-makers, tuning forks, pure tone and speech audiometry, masking, and the like) will be considered in detail. These range from what is useful in ordinary office practice to procedures involving special facilities.

Particular attention will be given to current "objective" procedures whereby a child is conditioned to respond to test sounds. Some details of management will be discussed, and there will be consideration of the relation between various causal factors and test findings and the development of language and speech in the child.

COURSE 313

Crystal Room Periods W-1, W-2

HOWARD P. HOUSE, M.D.
WILLIAM F. HOUSE, M.D.
JAMES L. SHEEHY, M.D.
Los Angeles

Reconstructive Surgery for Chronic Ear Disease

A two-period course—$4.00

Tympanoplastic procedures have undergone tremendous changes since their introduction in the early 1950's. The dual aims of tympanoplasty are the eradication of infection and the reconstruction of the hearing mechanism of the middle ear.

The surgical philosophy of creating a safe ear by opening the ear spaces for drainage has been gradually replaced by a surgical approach designed to eradicate infection completely and to promote primary healing. The ultimate goal of tympanoplasty is the complete eradication of infection and the reconstruction of the sound conducting mechanism of the ear without leaving the surgical defect of a postoperative mastoid bowl.

Many problems in the attainment of this goal have been overcome. Every otolaryngologist should know the indications for newer medical and surgical therapy of the chronic ear patient.

COURSE 314

Room 721 Periods Th-1, Th-2

KENNETH C. JOHNSTON, M.D.
IRWIN D. HORWITZ, M.D.
BURTON J. SOBOROFF, M.D.
Chicago

Emergencies in Otolaryngology

A two-period course—$4.00

A panel discussion will cover the common emergencies encountered in otolaryngologic practice under three principal headings: injuries of the head and face, including intracranial complications; control of hemorrhage and simple methods of estimating blood loss to permit adequate restoration of blood volume; and, finally, the recognition and management of acute respiratory obstruction, considering anomalies, acute infections and injuries of the larynx and tracheobronchial tree and a brief review of sudden and severe obstruction due to foreign bodies in the air passages.

Kodachrome slides will be used for demonstration. Time will be allotted for general discussion and pertinent questions at the end of the panel presentation.

COURSE 315

Room 731 Periods W-2, W-3

VARAZTAD H. KAZANJIAN, M.D.
Boston
JOHN MARQUIS CONVERSE, M.D.
New York
EDGAR M. HOLMES, M.D.
Boston

Traumatic Injuries of the Face

A two-period course—$4.00

The symposium on early treatment of facial injuries, to be held during the first period, will cover (1) emergency measures consisting of the control of primary hemorrhage, traumatic shock, and other necessary first aid measures; (2) local examination of lacerations and fractures of the face plus general physical examination; and (3) early treatment of soft tissues, primary and late primary suturing of lacerations, and the immobilization of fractures with special reference to fractures of the nasal, zygomatic and maxillary bones.

The second period will be utilized for a symposium on treatment of deformities of the face of traumatic origin, including discussion of (1) some general principles of reconstructive surgery of the face, and (2) repair of deformities involving soft tissues only, including (a) conspicuous scars without apparent loss of tissue, (b) defects with definite loss of tissue requiring use of pedicle or skin grafts, (c) special areas such as the eyelids and eyebrows, and (4) stenosis of the nasal passages.

COURSE 316

Room 740 Periods W-2, W-3

MERLE LAWRENCE, Ph.D.
Ann Arbor, Mich.

Acoustic Principles in Middle Ear Surgery

A two-period course—$4.00

This course is an elementary explanation of the acoustic-mechanical properties of the middle ear apparatus. Those anatomic characteristics of the ear that provide for efficient transfer of air-borne sound vibrations to the fluids of the inner ear will be discussed. The various ways in which structural alteration or disease processes can affect these middle ear properties, together with the basic principles that must be adhered to in restoring adequate sound conduction, will be described.

The material covered will be divided into two parts. In part one, the normal actions of the middle ear as a mechanical transformer will be described, and the reasons for certain patterns of audiometric loss due to various pathologic conditions will be explained.

In part two, principles of middle ear reconstruction that can satisfactorily re-establish the mechanical principles that make the normal ear an efficient device will be evaluated, and the effects of different procedures on the resulting audiogram will be discussed.

COURSE 317

Room 738 Periods Th-1, Th-2

JOSEPH H. OGURA, M.D.
St. Louis
MAX L. SOM, M.D.
New York

Laryngeal Surgery:
Radical and Conservation Surgery

A two-period course—$4.00

Cancer of the larynx and pharynx has been treated usually by total laryngectomy. The authors will present their method for treating cancer of the larynx by radical laryngectomy and neck dissection or by conservation surgery. Pathologic observations for lesions in various sites in the larynx, together with the long and short term observations will be presented. The technique, complications and methods for handling the conservation operation for supraglottic and pharyngeal cancers will be presented. Lantern slides and motion pictures will be shown.

COURSE 318

Room 733 Periods T-2, T-3

KINSEY M. SIMONTON, M.D.
Rochester, Minn.
SCOTT N. REGER, Ph.D.
Iowa City

ALAN S. FELDMAN, Ph.D.
Syracuse, N. Y.

BY INVITATION

ROBERT E. KLOTZ, M.D.
Boston

What the Otologist Should Know About Hearing Aids

A two-period course—$4.00

This will be an informal question-and-answer symposium on hearing-aid problems as they arise in daily otologic practice. The participants are invited to submit such questions as the following:

When does a hard-of-hearing patient need a hearing aid?

What are the comparative merits of bone and air conduction instruments?

What are the limitations of a hearing aid?

What is the best hearing aid?

How should the patient go about getting a hearing aid?

What can the otologist do to combat high-pressure salesmanship?

COURSE 319

Room 715 Periods T-2, T-3

GEORGE A. SISSON, M.D.
NORMAN E. JOHNSON, M.D.
and
FRANK BATLEY, M.D.

BY INVITATION

JACK J. ROSE, D.D.S.

BY INVITATION
Syracuse, N. Y.

Team Judgment in the Management of Head and Neck Cancer

A two-period course—$4.00

A successful head and neck cancer team should be composed of an alert diagnostician, a competent surgeon, a widely trained radiotherapist and a qualified prosthodontist. The format for preoperative conferences with all members of the team participating will be described as it operates now at the State University of New York Upstate Medical Center.

Difficulties encountered when determining primary or secondary modality of treatment used will be presented by both surgeon and radiotherapist. All principal areas of the head and neck will be included in the discussion.

A prosthodontist will explain how he can give support most effectively both in the operating room and postoperatively. A model case will be presented to illustrate how the services of a cancer control team are integrated.

COURSE 320

Room 727 Periods W-2, W-3

MAX L. SOM, M.D.
MICHAEL L. LEWIN, M.D.
New York

Reconstructive Procedure in Management of Head and Neck Tumors

A two-period course—$4.00

This course will include discussion of the various procedures which either are included in the primary operation or are done subsequently.

Illustrations demonstrating the operative technique in some of the following procedures will be stressed:

1. Lining the floor of the mouth with a cervical skin flap for carcinoma of the anterior portion of the mandible and tongue
2. Immobilization of mandibular fragments at the time of primary operation
3. Bone grafts to the mandible
4. Secondary release of the tongue following the pull-through operation or the composite procedure
5. Reconstruction of the lip after excision for carcinoma
6. Lining the cheek flaps in maxillectomies
7. Face and scalp flaps for repair of operative defects
8. Correction of deformities of the neck following radical composite operations
9. Reconstruction of the cervical esophagus or pharynx after laryngoesophagectomy
10. Revision of microstoma

COURSE 321

Room 711 Periods Th-1, Th-2

THEODORE E. WALSH, M.D.
St. Louis

What Can Be Done for Deafness

A two-period course—$4.00

The problems of relieving deafness, including the efficacy or failure of various forms of treatment and surgery, will be considered. The value of hearing aids and rehabilitation measures for patients who cannot be helped by medical or surgical means will be discussed. The apparent success of quackery will be explained. The members of the course are encouraged to submit questions and to join actively in an informal discussion of the subject.

COURSE 322

Room 743 Periods T-1, T-2, W-1

Home Study Course — Discussion Periods

A three-period course—$6.00

These discussion periods will be conducted by members of the faculty of the Home Study Course in Otolaryngology, and will be related to material included in that Course. They will provide a review of basic considerations and present up-to-date clinical applications.

T-1—Pharmacology

Kinsey M. Simonton, M.D.
Rochester, Minn.

Walter H. Maloney, M.D.
Cleveland

T-2—Physiology: Functional Neurophysiology of Hearing

Harold F. Schuknecht, M.D.
Detroit

William H. Saunders, M.D.
Columbus, Ohio

W-1—Hearing Function and Testing

Aram Glorig, M.D.
Los Angeles

Ludwig A. Michael, M.D.
Dallas

COURSE 401

Room 712 Period T-1

LUCIAN W. ALEXANDER, M.D.
New Orleans

The Adenoid Problem

There is no operation in surgery so badly done in such a large percentage of cases as the adenoid operation. A discussion of the pathology, techniques, failure in results, postoperative treatment to avoid middle ear infection, the management of adenoid remnants and case histories will be presented.

Kodachrome slides will be used.

COURSE 402

Room 706 Period W-1

VICTOR R. ALFARO, M.D.
Washington, D.C.

Fullness in the Ear: Differential Diagnosis

Fullness in the ear, a symptom commonly seen in otologic practice, is usually thought to indicate disorders of the conductive mechanism in the external canal, middle ear, or eustachian tube. Careful appraisal of patients with fullness in the ear, however, reveals that it is a very common symptom of early labyrinthine hydrops. In advanced labyrinthine hyrops the diagnosis is self-evident because of the involvement of the vestibular apparatus as well as the cochlea. Early recognition, therefore, is most important for the establishment of early therapy that will prevent the mild hydrops from becoming severe. The symptomatology, audiometric picture, differential diagnosis and treatment will be discussed.

COURSE 403

Room 712 Period Th-1

VICTOR R. ALFARO, M.D.
Washington, D.C.

Plans for the Office

Because of the nature of his specialty, the otolaryngologist does the major part of his work in his office. An attractive and efficient office will do much to enhance the enjoyment of his profession. The modern otolaryngologist must be ready to serve the public with adequate technical facilities and pleasant surroundings.

This course is designed to help those who may be contemplating the remodeling of an old office or the planning of a new one. The pros and cons of office building ownership will be presented. The arrangement and size of treatment rooms, laboratory and allergy rooms, and soundproof audiometric unit will be discussed. Blueprints of office architecture will be shown on slides, and printed copies of these will be distributed.

COURSE 404

Room 724 Period T-3

FRANZ ALTMANN, M.D.
JULES G. WALTNER, M.D.
New York

Treatment of Meniere's Disease with Ultrasonic Waves

The basic principles and the technique of irradiation of the labyrinth with ultrasound will be discussed.

With a specially constructed applicator the ultrasound is given directly to the exposed bony lateral semicircular canal. This permits destruction of the vestibular portion of the labyrinth without damage to the cochlea.

The results of this treatment in patients with Meniere's disease which had been refractory to medical treatment will be analyzed. They are very satisfactory, since the preservation of hearing is far superior to that obtained with any other form of surgical treatment.

COURSE 405

Room 710 Period T-3 or W-3

BARRY J. ANSON, Ph.D.
Chicago

BY INVITATION

Developmental and Adult Anatomy of the Ear and Temporal Bone in Relation to the Problems of Endaural Surgery

The major hazards in currently favored procedures in otological surgery are set by the following features of structure, form or position of the auditory ossicles, membranous labyrinth and bone of the osseous labyrinth: retention, by the stapes, of its embryonic cartilage and fetal bone (with consequent, and excessive, fragility in adult structure and lessened ability to heal); blood supply through vessels lodged chiefly in the investing mucosal tissue of the ossicles; proximity of the stapedial base to vital parts of the endolymphatic duct-system; narrowing of the surgeon's "working space" of the middle ear by the promontory of the cochlea and the arch of the facial canal (producing the "stapes niche"); thinness of the wall of the cochlea; dehiscence of the facial canal or variation in the course of the nerve. Additionally, the following features will be discussed: structure of the perilymphatic (periotic) duct (in relation to fluid resorption); histologic architecture of the otic capsule in the areas of otosclerotic involvement; tissue changes in bone dystrophies.

COURSE 406

Room 710 Period W-1

BEVERLY WELLER ARMSTRONG, M.D.
Charlotte, N. C.

Use of Vinyl Tubing in the Treatment of Chronic Secretory Otitis Media

In the past fifteen years we have observed an increase in the incidence of chronic secretory otitis media. It is the most common cause of impaired hearing in children. Experience in ventilating the middle ear with indwelling plastic tubing will be presented and the results analyzed. The lecture will be illustrated with a motion picture and lantern slides.

COURSE 407

Room 710 Period Th-1

JOSEPH P. ATKINS, M.D.
Philadelphia

Bronchoscopic Problems of Infancy and Childhood

The true test of an endoscopist's skill is the way he handles the endoscopic problems of the child. The difficulties which may be encountered and the techniques most useful in eliminating them will be discussed. Radiologic evaluation of bronchoscopic problems and endoscopic techniques most useful in the solution of these problems will be considered.

COURSE 408

Room 736 Period Th-2

DAVID F. AUSTIN, M.D.
Memphis

Tympanoplasty Utilizing Vein Graft

The subject matter of this course will cover techniques and methods used in a new system of tympanoplasty utilizing vein graft. The methods used in repairing the eardrum and the ossicular chain and in approaching and controlling the pathologic changes of the middle ear attic in mastoid will be described. These methods will be demonstrated with film and slides.

COURSE 409

Room 727 Period T-3

GEOFFREY H. BATEMAN, M.D.
London, England

BY INVITATION

Trans-Sphenoidal Hypophysectomy: Combined Septal and Ethmoidal Approach

The technique of operation will be discussed. The relative advantages and disadvantages of the various approaches will be brought forward for discussion.

The instruments needed for the operation will be shown and their use explained.

The types of cases already operated on will be mentioned. These include secondary carcinoma of the breast, pituitary tumors, cerebrospinal rhinorrhea following yttrium implants into the pituitary fossa and diabetic retinitis. Other possible applications of the operation will be discussed.

The difficulties encountered in the operation and in the aftercare of the patients will be detailed.

COURSE 410

Room 722 Period Th-2

OSCAR J. BECKER, M.D.
Chicago

Plastic Surgery of Protruding Ears

An original technique for correcting protruding ears is to be presented. This method has proved highly satisfactory in reproducing the normal contours of the auricle and in setting the ear back to the head at the proper angle.

The anatomy of the external ear, the etiology and pathology of protruding ears, and a historical survey of operative procedures will be included in the discussion.

COURSE 411

Room 715 Period Th-2

HENRY H. BEINFIELD, M.D.
Brooklyn, N. Y.

Surgical Management of Bony Choanal Atresia of the Posterior Nares

Until very recently, little has been known about bilateral choanal atresia in the newborn and its relationship to asphyxia neonatorum. If infants with this anomaly are to be saved from suffocation at birth, one must know how to make a diagnosis and then be prepared to create a clear nasal airway within the first twenty-four hours of life.

Choanal atresia will be described together with the intranasal approach for its correction in the infant, young child, and adult.

Slides will be shown illustrating the technique.

COURSE 412

Room 728 Period W-3 or Th-3

JULIUS W. BELL, M.D.
New York

Correction of Outstanding Ears

A new approach for the correction of the outstanding ear is presented.

The auricle is divided into three compartments by two horizontal lines: one at the level of the bifurcation of the crura of the antihelix, the other at the level of the antitragus. The elements in their respective divisions are corrected in orderly sequence with assurance that the normal configuration will be automatically restored as soon as the pathologic factors are removed. If adopted, this technique will be helpful to the beginner in his otoplastic operation.

In the lower compartment, techniques will be given for the correction of the forward cocking of the lobule, the cauda helicis and the conchal structures medial to the antitragus.

In the middle compartment, procedures will be presented for reconstruction of the scaphoconchal and cephaloconchal angles.

In the upper compartment, the management of the superior and inferior crura, the triangular fossa and the helix will be discussed in detail.

COURSE 413

Room 796 Period W-2 or Th-2

RICHARD J. BELLUCCI, M.D.
New York

Surgery of the Stapes and Oval Window

The surgically important anatomic characteristics of the tympanic membrane, stapes, oval window, and other structures in the operation for mobilization of the stapes will be discussed.

The technical considerations involved in performing the operation on the stapes and oval window will be discussed. An evaluation of the advantages and limitations of this surgical procedure will be presented.

COURSE 414

Room 713 Period Th-1

IRVING M. BLATT, M.D.
New Orleans, La.

Diseases of the Salivary Glands: Differential Diagnosis

This course consists of a discussion of the differential diagnosis of the more common inflammatory and neoplastic diseases which involve and are adjacent to the major salivary glands. Conditions such as strictures, stones, inflammatory cysts and benign sialolymphadenopathy as well as intrinsic and extrinsic neoplasms will be illustrated.

The technique and objective of sialography will be described.

COURSE 415

Room 722 Period T-3

NATHAN A. BOLOTOW, M.D.
Providence, R. I.

Rhinoplasty: Recent Concepts

Any applied art, such as rhinoplasty, becomes obsolete within a few years because of the constantly increasing information, the modification of the surgeon's view, and his greater experience. An attempt will be made to present the newer concepts and techniques in the process of shortening the nose, modeling the lobule, narrowing the nasal pyramid, and hump removal. Unsolved problems in rhinoplasty will be discussed.

COURSE 416

Room 740 Period W-1

WESLEY H. BRADLEY, M.D.
Syracuse, N. Y.

Practical Office Speech Audiometry

The use of speech audiometry has become established as one of our most helpful diagnostic tools. Yet, many practicing otolaryngologists have completely disregarded its use because of the mistaken belief that speech audiometry requires extensive space, expensive equipment, and many extra hours for testing. In this course, I shall attempt to show how speech audiometry can be done in a very practical manner by the average otolaryngologist without extensive space changes and equipment additions. Illustrative cases will be used to show some of the diagnostic rewards obtained from its use.

COURSE 417

Room 715 Period W-3

ARNOLD K. BRENMAN, M.D.
Philadelphia

BY INVITATION

Photography with the Operation Microscope

A simple and practical technique for making color photographs with the operation microscope under surgical conditions will be described and demonstrated. Ektachrome transparencies and kodachrome prints will be displayed in order to illustrate typical microsurgical situations; the specific illumination and exposure settings necessary for each will be discussed. Since the technique is applicable to most 35 mm. single-lens reflex cameras, participants are invited to bring their cameras so that specific questions can be answered.

COURSE 418

Room 728 Period W-2

FRIEDRICH S. BRODNITZ, M.D.
New York

Nodules, Polyps and Contact Ulcer of the Larynx

These conditions have in common, misuse of the voice, which is the main cause, and the disturbance of vocal function which is the chief complaint. To the patient, the yardstick for the success of the treatment is not the laryngoscopic appearance of the cords, but the improvement of the voice.

Recurrence can be avoided only if the underlying cause of vocal misuse is eliminated together with the removal of the lesion. The task of the laryngologist treat-

ing the patient who has benign changes of the vocal cords does not end with the performance of laryngeal surgery but has to include the rehabilitation of the voice of the patient.

Etiology, diagnosis, and therapy of nodules, polyps (and polypoid thickening of the cords) and of contact ulcer will be discussed in detail, with special emphasis on these points of practical importance:

1. Common faults of vocal use
2. Conservative and/or surgical treatment
3. Resumption of voice after the operation
4. Simplified methods of vocal re-education
5. The professional speaker and his voice problems

The course will be illustrated by voice recordings.

COURSE 419

Room 706 Period Th-2

HENRY A. BROWN, M.D.
Rochester, Minn.

Otologic Evaluation of Cerebellopontine Angle Tumors

About 10 per cent of all intracranial tumors involve the cerebellopontine angle. Acoustic neuromas, as well as less common cerebellopontine angle tumors, usually involve the eighth cranial nerve early in their course of development. Early diagnosis of these tumors is extremely important, as operative results depend greatly on the size of the tumor and the extent of tumor damage to surrounding important intracranial structures. Emphasis will be placed on early recognition of cerebellopontine angle tumors. The diagnostic problem will be approached under the following headings:

1. Types of tumors which may invade the cerebellopontine angle
2. Discussion of acoustic neuroma, the most common angle lesion
3. Comparison of signs and symptoms found in acoustic neuroma with those of meningioma of the cerebellopontine angle
4. Bilateral acoustic neurofibromas
5. Discussion of infrequent cerebellopontine angle tumors
6. The role of the audiogram, tests for recruitment and evaluation of labyrinthine function in the diagnosis of cerebellopontine angle tumors and in differentiating these tumors from eighth nerve and organ disease.

COURSE 420

Room 727 Period Th-1

RAYMOND CARHART, Ph.D.
Evanston, Ill.

BY INVITATION

Tests for Malingering

The course first considers the peculiar responses which malingerers frequently exhibit during conventional pure tone and speech audiometry. It then discusses the battery of special auditory tests which have been perfected in recent years for detection of malingering. These special tests include psychogalvanic audiometry, delayed speech feedback, audiometric Stenger, and D-S test. Finally, the course summarizes the configurations of special test findings which seem to characterize pseudohypoacusis and reviews the audiologic distinction between malingering and psychogenic hearing loss.

COURSE 421

Room 736 Period W-1 or Th-1

AUGUST P. CIELL, M.D.
Haddonfield, N. J.

Hypnosis in Otolaryngology

The phenomenon of suggestibility and the hypnotic trance has been known for thousands of years, but it has only recently been accepted as a useful adjunct to medical therapy.

The otolaryngologist can master this art with a minimum of effort. In his office he may induce safe anesthesia and remove the gag reflex and annoying anxiety symptoms. In the operating room he can effectively alleviate preoperative anxiety and postoperative pain.

In this course an attempt will be made to cover the use of hypnosis in otolaryngology, and tests for suggestibility, using members of the course for subjects, will be demonstrated. A quick and practical method for inducing the hypnotic trance will be demonstrated if time allows.

COURSE 422

Room 706 Period W-3

EDWIN W. COCKE, JR., M.D.
Memphis

Salivary Gland Tumors: Management

The differential diagnosis, surgical anatomy, and surgical procedures pertaining to salivary gland tumors will be discussed.

The management of parotid salivary tumors and the related facial nerve will be emphasized. The material to be presented is not new and is not meant for instruction of those who feel that they can now confidently perform these operations. The material will be illustrated on 35 millimeter slides.

COURSE 423

Room 711 Period W-3

CLAUDE C. CODY, III, M.D.
Houston, Texas

Present Day Concepts in Major Sinus Surgery

1. Radical Frontal Sinus Approach
   a. The Hairline Killian or Coronal Frontal Incision
   b. Lynch Technique
2. Fronto-ethmoid Sinusotomy
3. Radical Maxillary Sinus Approach or Caldwell-Luc
4. Transantral Ethmoidectomy
5. Closure of Oro-antral Fistula

In this course the severe diseases of the bones and mucous membranes of the paranasal sinuses will be covered and their treatment with antibiotic coverage and such implants as skin grafts, both autogenous and heterogenous, and tantalum discussed. All of the new growths best approached via the old sinus surgery technique will also be discussed.

In addition to the appropriate antibiotics which we now employ, we have new instruments, such as the various types of electric drills, motor driven suction machines, a more intense light concentration, the use of magnification in surgery, the increasing availability of bone banks, and probably better anesthetic methods which keep the tracheobronchial tree quite dry. All of these in conjunction with excellent hospital care have greatly reduced morbidity and even mortality.

The purpose of this course is to keep the old and time-proven approaches alive with all of our added knowledge about technique and hospital care. With the decrease in sinus surgery, it is feared that much of our hard-won knowledge will die with the senior members. We can now safely carry out procedures which formerly we would dare not touch and can redo cases that were done previously and expect excellent results. The old and irreparably damaged tissues still have to be completely removed, but we have more means available for doing this at the present time.

If a sinus operation is really indicated, and if it is well done, we then may expect a cure.

COURSE 424

Room 727 Period T-1 or W-1

WESLEY E. COMPERE, JR., M.D.
Los Angeles

Radiologic Examination of Mastoid, Middle Ear and Eustachian Tube

The equipment, positions, and techniques necessary for the visualization of disease in the tympanic cavity, attic, and aditus will be described, as well as the radiologic methods of evaluating function of the eustachian tube. When possible the radiographic findings will be correlated with the surgical findings, procedures, and results.

COURSE 425

Room 721 Period W-3

DONALD A. CORGILL, M.D.
Dallas, Texas

Radical Hypopharyngeal Surgery and Chemotherapeutic Arterial Infusion Technique

Patients when first seen by the laryngologist are often suffering from advanced

stages of carcinomatous disease of the hypopharynx, involving the larynx, pharynx, tonsil, base of the tongue, with local metastasis to the neck already present on either one or both sides. A one-stage surgical procedure adequately encompassing all malignant tissue, together with methods of primary (aortic homograft) or secondary reconstruction, immediate and long-term postoperative results, complications, including the problem of the carotid artery, and methods of dealing with them, will be described with the aid of color slides and a color motion picture of the operations and of the complications. Time sequence photography has been applied to the resolving complications. The results of such very radical procedures during a thirteen-year experience will be presented.

For carcinomas not suitable for surgical extirpation, newer chemotherapeutic agents administered intra-arterially appear to have some value. Simple techniques of arterial catheter installation will be demonstrated with color slides, including the proper selection of catheters, suture materials and safe cancericidal agent systems; the prevention of kinking, leaking, rupture and extrusion of the catheter; the use of fluorescein and ultraviolet light to ascertain the placing of the catheter for correct distribution of the drug. A relatively simple and reliable home-made pump will be shown.

COURSE 426

Crystal Room — Period W-3

EUGENE L. DERLACKI, M.D.
GEORGE E. SHAMBAUGH, JR., M.D.
WILEY H. HARRISON, M.D.
Chicago

Conservative Stapes Surgery

The evolution of stapes surgery has not as yet resulted in a single universally accepted philosophy of attack upon the variable stapediovestibular otosclerotic pathologic changes. A conservative surgical philosophy requires a facile flexibility in the choice and execution of a surgical technique which varies with the bone disease. Our application of several graduated bypass stapes operations, as well as partial and total stapedectomy with various graft materials, will be discussed and then visually portrayed in a new sound motion picture.

COURSE 427

Room 711 — Period T-3

KENNETH D. DEVINE, M.D.
Rochester, Minn.

Total Laryngectomy: Anatomy and a Technique

This course will consist of a short history of the operation, laryngectomy, a motion picture showing a technique of total laryngectomy, and a lecture on the pertinent anatomy illustrated with lantern slides.

COURSE 428

Room 728 — Period T-1 or W-1

DAVID D. DeWEESE, M.D.
Portland, Ore.

The Problem of the Dizzy Patient

This course will include a discussion of the factors to be taken into consideration in making a differential diagnosis of the patient who comes to the physician with the complaint of "dizziness." There will be remarks on the importance of certain facets of history taking. There will also be a discussion of nystagmus and of the value and interpretation of labyrinthine tests. A workable outline of those diseases and conditions which must be taken into account when considering the symptom of dizziness will be presented. An attempt will be made to keep in mind those practical points which are of value in differential diagnosis of this symptom in everyday practice. Treatment of certain types of dizziness and vertigo will be considered.

COURSE 429

Room 713 — Period Th-2

JOHN T. DICKINSON, M.D.
Pittsburgh

Grafts and Implants in the Repair of Facial Deformities

Many facial deformities can be corrected by repositioning local structures. When this is not feasible, the use of a graft or implant must be considered.

At present there is no universal stuffing agent to meet all of our needs. The pur-

pose of this discussion is to determine the most efficacious material to use in the correction of any specific deformity. To accomplish this, consideration will be given to:

A. Meticulous analysis of the deformity itself, including such clinical factors as the status of the local tissues. Are they healthy and vascular or are they atrophic and ischemic, secondary to irradiation or scar tissue?

B. Consideration is given to the limitations and advantages of the various grafts and implants that might be used. Grafts are defined as transplants of organic tissues with living cells, and include fresh autogenous bone, cartilage, fascia, fat, nerve and skin. Implants comprise all nonliving substances and are subdivided into preserved tissues and inorganic materials.

COURSE 430

Room 732 Period W-3 or Th-3

JOHN B. ERICH, M.D.
Rochester, Minn.

Fractures of the Facial Bones

This course will deal with fractures involving the mandible, maxilla, malar and nasal bones. The methods of treatment which have been found most effective at the Mayo Clinic will be stressed, and classifications which facilitate the management of some of these traumatic injuries will be discussed.

COURSE 431

Crystal Room Period T-1

J. BROWN FARRIOR, M.D.
Tampa, Fla.

Tympanoplasty: Surgical Pathology and Technique

The primary purpose of this course is to demonstrate the varying degrees of surgical pathology of the chronic ear and their effect upon the results of tympanoplastic surgery. The surgical techniques of tympanoplasty will be presented, including the internal vein graft, the endaural posterior pedicle musculoplasty atticotomy and ossicular repositioning and prostheses.

COURSE 432

Crystal Room Period T-2

J. BROWN FARRIOR, M.D.
Tampa, Fla.

Stapes Operations, 1961

This course will present in 35-mm. enlargements the basic slides of the stereoscopic atlas, "Stapes Operations in 3-D, Surgical Pathology and Technique," with additional slides to demonstrate the surgical techniques for the removal of the stapedial footplate in the varying degrees of pathological involvement, the hazards of fenestration of the oval window in obliterative otosclerosis, the complications of stapes surgery, the techniques for the utilization of normal portions of the stapes as partial stapedectomy, anterior crurotomy, crural repositioning and the use of prosthetic crura and grafts.

COURSE 433

Room 736 Period W-3

RICHARD T. FARRIOR, M.D.
Tampa, Fla.

A Method of Otoplasty

A new technique for producing normal contour of the antihelix and scaphoid fossa in the correction of protruding ears will be presented. Detailed attention will be given to the anatomy of the average normal ear. Cadaver sections will be used for illustration.

A critical comparison will be made of the currently used techniques and the method presented. A historical review of the operation will be outlined and the shortcomings of earlier procedures pointed out. Errors in technique and additional combined techniques will be incorporated.

The course will be illustrated by color transparencies of the anatomy, surgical technique of the actual operation, and surgical results, with emphasis upon normal contour as seen from the side.

A new cartilage knife to facilitate removal of the longitudinal cartilage wedges is introduced. The detailed technique for the use of this knife is included in the course with demonstration on preserved cartilage.

COURSE 434

Room 715 Period Th-3

RICHARD T. FARRIOR, M.D.
Tampa, Fla.

Cervico-Facial Congenital Anomalies

This course is presented for a correlation of the developmental anatomy and the clinical management of the congenital anomalies of the cervical and facial areas. An understanding of the anatomic development is necessary for a thorough knowledge of the surgical anatomy of the cervico-facial area.

The subject of these congenital abnormalities is presented with the hope of stimulating interest in these anomalies which are so directly related to the specialty of otolaryngology.

The course is illustrated with color slides of developmental anatomy and clinical cases.

COURSE 435

Room 727 Period Th-3

ALAN S. FELDMAN, Ph.D.
Syracuse, N. Y.
BY INVITATION

Practical Solutions of Bone Conduction Audiometry

While it is unlikely that complete control of all variables encountered in the measurement of bone conduction thresholds is readily attainable, there are many helpful procedures which are frequently overlooked. This course is intended to highlight certain variables which may interfere with the measurement of bone conduction and those methods which are available for their appropriate control. Consideration will be given to such factors as problems associated with lateralization and occlusion, advantages and limitations of masking, recognition of erroneous results, and techniques for the validation of thresholds.

COURSE 436

Room 732 Period W-1

G. SLAUGHTER FITZ-HUGH, M.D.
WALTER C. McLEAN, M.D.
Charlottesville, Va.

Salivary Glands: Common Disorders

The course, which is revised and brought up to date each year, is designed again to cover some of the more common disorders of salivary gland tissue which may be encountered by the otolaryngologist. An outline of the presentation with a good working bibliography has been prepared and is furnished those registering for the course.

The recognition and treatment of sialadenitis, calculi formation, hypertrophy of tissue, and neoplasms are considered. More emphasis is placed upon non-neoplastic disease rather than neoplastic, in view of other courses available for the student.

Projected diagrams, charts, and slides illustrating certain points are utilized freely.

An attempt is made to reserve some time near the end of the hour for a question and answer period.

COURSE 437

Room 712 Period W-1

THOMAS F. FLYNN, M.D.
Woodbury, N. J.

Chronic Sinusitis: Diagnosis and Treatment

The diagnosis of chronic disease of the paranasal sinuses requires systematic review of the patient's history and clinical findings. The evaluation of the cellular pathology of sinus secretions and biopsy of the mucous membrane offers a means of differentiating subacute, chronic, specific, nonspecific or neoplastic disease. The inflammatory changes in the nose and sinuses exhibit similar basic reactions seen in other organs. The results of medical and surgical treatment can be prognosticated with some degree of accuracy in such disorders as sarcoidosis, chronic infection and benign or malignant sinuses.

Benign pathologic alterations in the sinus epithelium are common and may be extensive, with the resultant metaplasia filling the sinus with papillary or polypoid mucosa.

The medical treatment of chronic sinusi-

tis with those potent agents — the antibiotics, antihistaminics and steroids — is important today.

Surgical measures are necessary less frequently, but they are indicated in certain instances. These indications will be discussed. The type of operation must fit the needs of the individual patient.

In review of this problem the following are considered:

1. Methods of diagnosis
2. Technique of biopsy of sinus mucosa and result of histologic study
3. Adequate medical treatment
4. Indications for operation
5. Choice and techniques of operation
6. End results of sinus operation

COURSE 438

Room 736 Period T-2

EDMUND P. FOWLER, JR., M.D.
New York

Facial Paralysis

This course will include discussion of the following points:

1. Etiology of neuritis of the seventh nerve
2. Bell's palsy
3. Traumatic injuries of the facial nerve, including those instant to fracture of the temporal bone
4. Tumor invasion
5. Variations in the course of the seventh nerve within the temporal bone

Special attention will be paid to the pathologic changes incident to repair and methods of decompressing and grafting the nerve. There will also be a discussion of the medical management of Bell's palsy, post-recovery associated movements, and involuntary twitches or tics.

COURSE 439

Room 713 Period Th-3

STANTON A. FRIEDBERG, M.D.
Chicago

Diseases of the Esophagus

The techniques of esophagoscopy will be reviewed with reference to their application to diagnostic problems and methods of treatment. Various diseases of the esophagus will be illustrated, stressing differential diagnosis. Particular attention will be directed to the problem of esophagitis of the so-called peptic or reflux type.

COURSE 440

Room 722 Period T-1

A. C. FURSTENBERG, M.D.
Ann Arbor, Mich.

Management of Nasal Obstruction

A discussion of nasal obstruction will stress the reflex and inflammatory symptoms of this disorder. Particular emphasis will be placed upon the role of the turbinates in nasal obstruction and its symptoms. Allergic factors will be referred to in a consideration of adequate and effective treatment.

COURSE 441

Room 724 Period Th-2

ARAM GLORIG, M.D.
Los Angeles

The Otolaryngologist and Hearing Aid Selection

The purpose of this course will be to answer many of the questions surrounding selection of a hearing aid, especially those which the "hearing loss patient" directs to the physician when he is informed that a hearing aid will be necessary.

COURSE 442

Room 724 Period W-1 or Th-1

IRVING B. GOLDMAN, M.D.
New York

Correction of the Deviated Nose

Reparative surgery for the deviated nose improperly carried out may change a moderate or severe deformity into a major defect. This causes physiologic disturbances superimposed on unsatisfactory esthetic results. The deviated nose is invariably associated with deflected septum; both can be

advantageously corrected at one operation by the procedure to be outlined. Restoration of normal intranasal as well as extranasal contour of the deviated nose is accomplished with a technique based on the principle of shifting displaced parts while maintaining support of the basic areas. Correction of the deviated nose with avoidance of "saddling," drooping of the tip and retraction of the columella can thus be achieved.

COURSE 443

Room 711 Period W-2

JOSEPH L. GOLDMAN, M.D.
New York

Opportunities for Intranasal Surgery

There is need for revived interest in intranasal surgery for coping with certain advanced phases of nasal and sinus disease. First, attention will be paid to methods to differentiate clearly disorders of vasomotor and of infectious origin. The indications for intranasal procedures will be discussed and the techniques concerned will be presented. The course will deal especially with the general problems of sinus lavage and polypectomy, the intranasal approach for acute and chronic frontal sinusitis, the treatment of the hyperplastic inferior turbinate by electrocoagulation and removal of posterior tip, and the therapeutic place for intranasal antrotomy and the sphenoethmoidectomy operation.

COURSE 444

Room 796 Period T-1 or W-1

VICTOR GOODHILL, M.D.
IRWIN HARRIS, M.D.
Los Angeles

Stapes Surgery: Perichondral Graft

Stapedectomy, subtotal or total, is now used in most cases of otosclerosis. In all such cases we employ the articulated polyethylene prosthesis connected to the incus by a special automatic introducer.

Subtotal stapedectomy with preservation of footplate is employed whenever otosclerotic footplate invasion is minimal and where a "virgin island" can be completely mobilized or where fragmentation of a normal central portion can be accomplished with ease.

Total stapedectomy is the procedure of choice where the footplate shows major otosclerotic infiltration. The oval window is sealed with a graft of perichondrium taken from the tip of the tragus. This preformed convex, "pouch" of perichondrium fits into the oval window. The articulated prosthesis is introduced to contact the graft in its concave aspect.

This technique will be illustrated with a colored motion picture taken through the dissecting microscope.

COURSE 445

Room 732 Period T-3

ARTHUR J. GORNEY, M.D.
Boston

Septum Surgery in the Twisted Nose

For the patient with a straight bony nose, whose septum is deviated and dislocated, with a typical twisting of the cartilaginous portion of the nose, rhinoplasty is often unnecessary or possibly not desired by the patient. This course will describe the details of an operation designed to correct the deviation of the septum along with the dislocation of the caudal end of the septal cartilage, at the same time straightening the twist of the lower part of the nose, without performing rhinoplasty. The operation has been taught for a number of years at the Boston City Hospital to the residents in otolaryngology, and has been performed successfully by them long before they could possibly qualify to do rhinoplasty.

This operation can therefore be used by the otolaryngologist whether he does rhinoplasty or not, to do adequate septum surgery on these cases without performing the rhinoplasty procedure. To many patients, this would be much more satisfactory. The general principles of the operation are also incorporated in the rhinoplasty operation, when indicated.

COURSE 446

Room 731 Period T-3

EUGENE L. GRANDON, M.D.
Iowa City

Plastic Surgical Procedures for the Otolaryngologist

Numerous lesions and minor deformities about the face and neck can easily be managed by the otolaryngologist. One must have a knowledge of skin grafting and the proper use of flaps to handle these cases adequately.

A variety of procedures will be described with actual case illustrations.

COURSE 447

Room 722 Period W-3

PAUL GUGGENHEIM, M.D.
Council Bluffs, Iowa.

Technique and Pitfalls of Adenoidectomy

1. Brief historical note*
2. The obscure anatomy and histology of the lateral nasopharyngeal lymphoid complex
3. What needs to be removed in what kind of case?
4. Whither radium?
5. Factors involved in the complication of cicatricial stenosis of the nasopharyngeal isthmus and how to avoid them
6. Round-table discussion on technique

*I expect to learn from the students something of the obscure and devious routes by which the "direct operation" spread to various cities from Los Angeles and Boston (where it originated independently fifteen years apart).

COURSE 448

Room 732 Period T-1 or Th-1

FREDERICK R. GUILFORD, M.D.
WILLIAM K. WRIGHT, M.D.
Houston, Texas

Obliterative Techniques in Mastoid and Tympanoplasty Cavities

This is a discussion of obliterative techniques used to ensure small mastoid and tympanoplasty cavities, allowing for more rapid and controlled healing of the cavity. Emphasis is placed on obtaining a small cavity completely lined with squamous epithelium within five weeks postoperatively. The potential cavity following mastoidectomy or tympanoplasty is made smaller by partial or complete obliteration of the mastoid bowl by swinging a pedicle of soft tissue into the defect from the postauricular muscle aponeurosis. A cavity approximating the size of the normal external auditory canal is the desired result.

Complete healing of the resultant cavity is effected in 90 per cent of the cavities within five weeks after operation, thus avoiding a long course of postoperative care and recurrent suppuration.

COURSE 449

Room 796 Period Th 3

FREDERICK R. GUILFORD, M.D.
WILLIAM K. WRIGHT, M.D.
Houston, Texas

Stapes Mobilization Techniques

This course will review our experience with the various techniques of stapes mobilization, from the original Rosen technique through the Shea stapedectomy with vein graft operation. Results obtained with each technique, including complications, will be reviewed.

Illustrations will include color slides depicting various types of otosclerotic involvement of the middle ear as well as congenital anomalies encountered in our series.

Details concerning our present method of selection of patients for stapes mobilization will be discussed. Our personal experience with the stapedectomy operation will be reviewed in detail, including techniques, problems encountered and postoperative results.

COURSE 450

Room 731 Period T-1

O. ERIK HALLBERG, M.D.
Rochester, Minn.

Newer Methods of Treatment of Severe Epistaxis

Severe nosebleed requires prompt and decisive action by the rhinologist. The tendency has been to make more extensive use of surgical intervention. However treatment varies greatly depending upon the site of the bleeding. The different types of medical and surgical treatments will also be discussed in detail.

COURSE 451

Room 731 Period T-2

O. ERIK HALLBERG, M.D.
Rochester, Minn.

Sudden Deafness and Its Implications

Sudden unilateral or bilateral impairment of hearing is a symptom, not a disease. It is very distressing, alarming to the patient, and deserves our most careful attention. The pathology, etiology, diagnostic factors and other pertinent data will be discussed. The most common cause of sudden deafness is thought to be vascular accident involving the blood supply to the cochlea, the equilibratory labyrinths, or both.

There is some evidence to show that patients so afflicted are more susceptible than the average patient to the development of other vascular accidents later in life. Treatment and type of examination needed will also be discussed in detail.

COURSE 452

Room 736 Period T-1

HERBERT P. HARKINS, M.D.
Philadelphia

Routine Office Management of Allergic Patients

The modern otolaryngologist daily sees patients who are suffering from allergies of the ear, nose and throat. It is essential that he be able to diagnose these conditions accurately and to outline effective and complete therapy.

The essential features of the following procedures will be discussed:

1. History taking
2. The clinical examination of the ear, nose and throat
3. Necessary laboratory studies to be performed in the office
4. Skin testing
5. Desensitization, both standard and high dilution
6. Elimination diets
7. Office surgical procedures

The course will be illustrated by lantern slides which show necessary equipment and techniques.

COURSE 453

Room 736 Period Th-3

JEROME A. HILGER, M.D.
St. Paul, Minn.

Tympanomastoid Surgery With Posterior Musculoplasty

Frequently in chronic suppurative middle ear and mastoid disease, the exact extent of the disease and the precise details of corrective technique are not determinable except at the operative procedure. The goals of surgery are elimination of disease, establishment of the best possible hearing level, and avoidance of tedious aftercare. A posterior pedicled muscle and connective tissue flap with or without attached skin for canal lining can be outlined and reserved in the first stage of surgery. At the conclusion of the definitive surgery, this flap can be shaped to meet the individual need. This may be obliteration of the posterior cavity or obliteration with diaphragmatic covering of the middle ear chamber. The details of technique and versatility of the method are presented in this hour.

COURSE 454

Room 728 Period T-2

RAYMOND L. HILSINGER, M.D.
Cincinnati

Vascular Headaches

In the far past all complicated headaches were considered migraine. In the more recent past, since the work of Horton, Wolff and Friedman, much has been done

to classify the various types of vascular headaches. However, the pendulum, as usual, has swung too far to the other side, and now there is far too much classification. If this continues, each little cranial artery will have its own headache syndrome.

In this course a very simple classification of vascular headaches will be proposed, and general diagnosis and treatment of both vasodilating and vasospastic headaches will be discussed. The symptomatic and prophylactic aspects of treatment will be considered.

COURSE 455

Room 722 Period Th-1

JACK V. D. HOUGH, M.D.
Oklahoma City

Partial Stapedectomy

This course will present a specific surgical method for removing the diseased footplate of the stapes from under the normal arch. By the preservation of the stapedial head and one crus, an efficient middle ear is obtained without using an artificial prosthesis or a tissue graft. With techniques allowing reduced healing, one may remove the entire footplate with little danger of inner ear damage.

The experience of 1000 consecutive cases will be reported with the encouraging findings of no dead ears, very little evidence of refixation, and an extremely good rate of air-bone gap closure.

Various phases of this operation will be discussed and illustrated by drawings and middle ear color photographs.

COURSE 456

Crystal Room Period Th-3

HOWARD P. HOUSE, M.D.
Los Angeles

Stapes Mobilization Procedures: Personal Experiences

The indications for stapes surgery will be discussed with emphasis on unilateral and advanced bilateral otosclerosis.

Each of the various techniques we have employed in a series of one hundred cases will be presented with a statistical analysis of the results.

The causes of failure in stapes surgery will be stressed.

The course will be illustrated by slides and a motion picture.

COURSE 457

Room 727 Period Th-2

JAMES F. JERGER, Ph.D.
Evanston, Ill.

BY INVITATION

Auditory Tests in Diagnosis

Lesions at various sites within the auditory mechanism are characterized by distinct patterns of auditory test results. By administering a battery of special tests, including Bekesy audiometry, loudness balance, SISI, and distorted speech tests, lesions in the middle ear, cochlea, eighth nerve, and central auditory pathways may be effectively differentiated. No single test can be relied on in all cases, but by the use of a sufficiently diversified battery, reliable and meaningful patterns may be identified.

COURSE 458

Room 711 Period Th-3

FORDYCE JOHNSON, M.D.
Pasadena, Calif.

Tonsillectomy and Adenoidectomy Surgery

Present day advancement compels the specialist to be better in his field than the general practitioner. Today the otolaryngologist should be able to show superior skill in tonsillectomy and adenoidectomy over his nonspecialist competitor. This course will show you the way to do just this, not only in the surgical procedure, but also in the preoperative and postoperative care of the patient.

The discussion, aided by slides and motion pictures, will include the advantages of the surgeon sitting at the head of the operating table, the pros and cons of intubation in tonsillectomy and adenoidectomy,

the examination of the adenoid area, nasopharynx and posterior nostrils, and the control of bleeding. The proper handling of the patient preoperatively and postoperatively with a discussion of fluids, electrolytes, metabolism, and catabolism as it applies to these operations will also be presented.

COURSE 459

Room 733 Period T-1

EDLEY H. JONES, M.D.
Vicksburg, Miss.

External Otitis, 1961

External otitis is not a specific entity; it is a general term embracing a variety of skin diseases with the common symptoms of pain and discomfort of the external ear and canal. Obviously no one "ear drop" or specific form of treatment can be adequately effective in all types.

While this course will follow basic principles in diagnosis and therapy, it will particularly discuss the application of continued research and clinical studies, and therapeutic agents now available.

COURSE 460

Room 734 Period T-3 or W-3

RAYMOND E. JORDAN, M.D.
Pittsburgh

Meniere's Disease: Diagnosis and Treatment

This course will cover the management of the patient with Meniere's disease. Diagnosis and therapy, both medical and surgical, will be presented. Discussion of medical therapy will be confined to the methods used by the author. Discussion of surgical management will include selection of cases for operation and procedures used. Long-term results of this type of management will be presented.

COURSE 461

Room 736 Period T-3 or W-2

ARTHUR L. JUERS, M.D.
Louisville, Ky.

Office Tympanic Perforation Closure: Marginal Eversion Technique

The original marginal eversion technique for office closure of central tympanic perforations has been modified somewhat. The perforation margin is treated more vigorously and an irritating ointment under a paper patch is used instead of the cotton patch and drops. A higher percentage of closures has been obtained with fewer average treatments than was true when using the original technique. Current results and specific problems encountered in individual cases will be discussed. The clinical aspects of tympanic sound conduction will be briefly reviewed.

COURSE 462

Room 721 Period Th-3

SHULAMITH KASTEIN
New York

BY INVITATION

Appraisal and Management of the Child with Audiological Problems, with Special Reference to Dysacusis

The number of children with auditory impairments is steadily increasing. Data will be used to discuss and illustrate predominance and distribution of the dysfunctions of these children.

Children referred to the otologist or to a speech and hearing clinic because of lack of response to spoken language and suspected of having a hearing loss may have a variety of conditions which cause their lack or lag of language development; they may have anacusis; hypoacusis; peripheral or central dysacusis. They may have mental retardation, emotional disturbance or psychosis, or clinical or subclinical central nervous system defects.

How the examiner can orient himself to the major areas of involvement in each child, within the confines of space and time of an office visit will be discussed. Time-saving diagnostic tests and an evaluation kit will be demonstrated, using those items from the complete battery of tests which have proven most reliable and practical in the detection of the underlying causes in the handicapped child.

Follow-up studies will be used as a frame of reference in the discussion of the therapeutic and educational management of these children.

COURSE 463

Room 727 Period T-2

GEORGE KELEMEN, M.D.
Boston

Pathology of Congenital Deafness

In their role as sources of congenital deafness, embryopathies (diseases acquired in utero) are commanding increased interest, compared with manifestly hereditary conditions. Histopathologic evidence regarding maternal lesions reproduced in the progeny will be presented, discussing: congenital syphilis, diabetes, nephritis, viral pneumonia, rubella, erythroblastosis fetalis, poliomyelitis, toxoplasmosis. The findings in humans will be evaluated in the light of correlated animal experimentation.

COURSE 464

CANCELLED

COURSE 465

Room 724 Period W-2

JOHN A. KIRCHNER, M.D.
New Haven, Conn.

Facial Bone Injuries

Trauma to the zygoma, maxilla or nose produces characteristic deformities in the middle third of the face. These changes may be obscured by hematoma or edema, but they can usually be found by careful physical and roentgenographic examination. Techniques of examination, methods of treatment, and details of surgical anatomy will be demonstrated by photographs of patients with the various types of injury.

COURSE 466

Room 738 Period T-1 or W-1

CLAIR M. KOS, M.D.
Iowa City

Vein Plug Stapedioplasty

Experience over the past five years with more than one thousand stapes operations, employing various techniques which have been statistically monitored, has led to the development of an improved technique currently used for the correction of hearing impairment due to otosclerosis.

Essentially, this procedure consists of stapedectomy, followed immediately by the insertion of a "vein plug" into the exposed oval window and the creation with a steel wire prosthesis of an incudovestibular arthroplasty which re-establishes the continuity of the ossicular chain. The results evaluated at the same stage of development as in previous techniques are much superior to those obtained heretofore.

Techniques used to remove even the most extensive otosclerotic growths from the oval window without resorting to the diamond burr and drill will be demonstrated. Other technical difficulties in addition to preoperative and postoperative patient care will be discussed.

COURSE 467

Room 733 Period W-2

COL. RALPH N. KRAUS, M.C.
MAJ. JOSEPH A. FUREY, M.C.
Brooks Air Force Base, Texas

Adventures in Space

Is space flight possible? This question is frequently posed to the physician. This course will prepare him to discuss the topic with factual information. The subject of weightlessness will be presented — what it is, how it is attained, as well as how it affects eating, drinking and motor performance. A brief motion picture will show these activities during the weightless state. Potential astronauts have been observed in a space cabin simulator for periods up to thirty days. Perceptual aberrations were observed. Psychomotor performance, alertness and changes in day-night cycling were recorded. The mechanism of adaptation to repetitive vestibular stimulation will be discussed. Current achievements in space flight will be presented.

COURSE 468

Room 738 Period W-3 or Th-3

CLIFFORD F. LAKE, M.D.
Rochester, Minn.

Secretory Otitis Media in Children

The course will consist of a lecture and slides covering the etiology, diagnosis and treatment of secretory otitis media in children.

The various appearances of the tympanic membrane in secretory otitis media, the importance of the history, and the role of infection and allergy all will be brought out in the course.

Various methods of treatment with particular emphasis on myringotomy and removal of lymphoid tissue in the nasopharynx will be demonstrated, and photomicrographs of smears of various types of otitis media will be shown.

COURSE 469

Room 710 Period W-2 or Th-2

FRANCIS L. LEDERER, M.D.
Chicago

Diagnostic and Therapeutic Pitfalls in Otolaryngologic Practice

From the very beginning of the interrogation to the culmination of medical and surgical management of the patient, potential mishaps and pitfalls are numerous. Inasmuch as patients seeking the services of the otolaryngologist confront him with symptoms of a varied nature, definitive management entails a matter of well chosen words and carefully selected modalities. In evaluating the challenging array of signs, symptoms, and symptom-complexes — headache, nasal blockage, dizziness, dysphagia, sore throat, otalgia, hoarseness, aural or nasal discharge, cough, obstructive states of the upper or lower airways, epistaxis, tinnitus, hearing loss, disturbance of facial, orbital or neck symmetry — pitfalls, mistakes, transgressions, accidents, and errors of ommission and commission are at times either apparent or evident. Although generally speaking none of these signs or symptoms is in itself diagnostic, all of them require careful evaluation for an accurate diagnosis to aid recovery, preserve function of a special sense organ, or save a life.

In this presentation the potentialities for error (diagnostic, therapeutic and surgical) are illustrated by charts and patient photographs in an effort to learn by the experience of others. Prevention is, after all, a matter of the knowledge that these pitfalls exist.

COURSE 470

Room 752 Period T-1

A. NEIL LEMON, M.D.
Philadelphia

Serous Otitis Media in Children

Serous otitis media accounts for mild to moderate hearing loss in too large a segment of our child population and is too often overlooked. Patients referred for removal of tonsils and adenoids were studied carefully and 17 per cent were found to have serous otitis media.

This course includes a discussion of (1) etiologic factors, (2) bacteriologic, pathologic and chemical studies of the fluid, (3) diagnosis, and (4) management. The recognition of serous otitis media is made simple by careful history, proper examination, and hearing analysis. Effective treatment will be discussed in detail step by step. Most of the ideas offered in this course are

visualized in lantern slides. Office care of the condition is minutely described and equipment demonstrated.

Time will be permitted for questions and answers.

COURSE 471

Room 738 Period W-2

ROBERT B. LEWY, M.D.
Chicago

Direct Laryngoscopy with Stability, Accuracy and Ease

This course will present a method and instruments designed to make the techniques of direct laryngoscopy easier and more accurate. It will include a motion picture demonstration of the chest suspension type of laryngoscopy. It will also show laryngoscopes designed to give a wide field for instrument maneuver, not constricted by a full tube. These function to permit two-instrument work and arytenoidectomy. Ease of method, lack of strain and of the awkward crouch will be emphasized.

Also to be demonstrated will be a method of depth perception for accurate marksmanship with forceps and better visualization and understanding of pathologic changes. Adequate magnification for precise one-forceps or two-instrument work will also be discussed. There will also be a discussion of practical and adequate preoperative sedation, local and general anesthetic.

COURSE 472

Room 796 Period Th-1

WALTER E. LOCH, M.D.
Baltimore

BY INVITATION

Septum Deviations: Techniques of Surgical Reconstruction

Techniques for reconstruction of the nasal septum for varying degrees of deviations, obstructions and impactions will be described, including the maxilla-premaxilla approach. Attention will be given to the surgical problems of the anterior part of the septum. The surgical anatomy of the septum and its related structures will be discussed with reference to its influence on the technical procedure and avoidance of possible unfavorable sequelae. The surgical techniques will be demonstrated on the cadaver.

COURSE 473

Room 715 Period T-1

JOHN M. LORE, JR., M.D.
Suffern, N. Y.

Vascular Surgery in the Head and Neck: Techniques

The basic principles involved in vascular surgery will be covered in detail. Vascular instruments, suture material and the types of sutures used will be demonstrated in relation to end-to-end arteriorrhaphy and lateral arteriorrhaphy. The various indications for vascular surgery, viz.: injury to vessels, aneurysms, arteriovenous fistulas, tumor invasion of vessels and obstructive arteriosclerosis, especially in the treatment of stroke, will be discussed. Familiarity with the use of vascular grafts (autogenous, homogenous, heterogenous and synthetic) is an integral part of the armamentarium of every surgeon doing major head and neck surgery. Demonstration will consist of the actual grafts as well as color slides.

COURSE 474

Room 706 Period Th-1

HOLLIE E. McHUGH, M.D.
Montreal, Que., Canada

The Surgical Treatment of Traumatic Conductive Deafness and Facial Paralysis

In closed head injuries, longitudinal fractures of the temporal bone are the most common cause of damage to the structures of the middle ear resulting in traumatic conductive deafness and peripheral facial paralysis. In this type of fracture the facial paralysis is most commonly due to compression of the surgically accessible tympanic portion of the nerve in contrast to the transverse type of fracture of the temporal bone, in which the facial nerve is more commonly severed.

The indications in time for surgical intervention will be presented.

Peripheral facial paralysis due to birth injuries may also be corrected at a very early age, but these present rather unique surgical problems in newborn infants.

A brief review of the present status of the surgical treatment for Bell's palsy will also be presented with a motion picture depicting the various types of incomplete or delayed recovery that should be considered as indications for surgical decompression of the facial nerve.

COURSE 475

Room 724 Period T-1

WILLIAM J. McNALLY, M.D.
Montreal, Que., Canada

Labyrinthine Tests

This course is intended to outline the physiological basis for the selection and interpretation of the current tests for labyrinthine function.

In addition to reviewing the pertinent physiological principles, the common tests are briefly described.

For more detailed consideration the student is referred to the Academy manual, "Examination of the Labyrinth in Relation to its Physiology and Nonsuppurative Diseases."

COURSE 476

Room 731 Period Th-1

SYLVESTER C. MISSAL, M.D.
Cleveland

The Cervico-Occipital Syndrome: A Neglected ENT Entity

Cervical root compression, the commonest cause of head and neck manifestations of the cervico-occipital syndrome, can cause symptom complexes which mimic a variety of ear, nose, and throat conditions. Such symptoms as vertigo, tinnitus, otalgia, cephalalgia, nuchal pain, sore throats and chest pains simulating cardiac or pulmonary disease may be manifestations of the syndrome. Unless the clinician is aware of such an entity he may make an erroneous diagnosis. Until recently little has been known about this relatively common condition. The course will consist of a discussion of the etiology, symptomatology, diagnosis and treatment of an important yet neglected clinical entity.

COURSE 477

Room 740 Period T-2

WILLIAM W. MONTGOMERY, M.D.
Boston

Arthritis of Larynx

The etiology, signs, and symptoms, laryngeal picture and therapy for both the acute and chronic stages of cricoarytenoid arthritis will be discussed. The pathology of the disease will be shown by projected slides. A twenty-minute motion picture with sound will demonstrate the step-by-step technique of arytenoidectomy for this disease, both on the cadaver and on the living person.

COURSE 478

Room 752 Period Th-2

DAVID MYERS, M.D.
Philadelphia

The Microsurgery of Otosclerosis

Microsurgery of the middle ear for the relief of otosclerotic deafness has undergone radical change since Rosen first presented his stapes mobilization operation. Rosen's early tilt technique has provided the basis for the subsequent development by other otologic surgeons of procedure such as pulsating techniques involving the application of pressure upon the incus, stapes head or footplate, as well as the various chisel procedures, Shea's stapedectomy with vein graft technique, the Gelfoam and footplate shattering procedures of House, and Hough's concepts of partial stapedectomy.

The purpose of this course is to trace briefly the historical development of otosclerosis surgery and to present a detailed description of the principles and application of the microsurgical techniques. The major portion of the course will be given

with consideration and detail of our experiences in the past three years with total stapedectomy, with the use of vein graft and plastic prosthesis. Statistical analysis of our results, a discussion of the complications and failures, will be included. Experiences of the past several years have taught us a great deal about the problems of this work about which we can speak with some authority at this time.

Details of surgical technique will be illustrated using kodachrome slides, and a statistical analysis of surgical results and complications will be presented.

COURSE 479

Room 738 Period T-2

PETER N. PASTORE, M.D.
Richmond, Va.

The Throat: Functional Problems

The discoveries and writings of the past twenty-five years have disclosed multiple factors contributing to symptoms and related sensations of the pharynx previously classified as neurotic.

There are many functional conditions in the region of the throat which, on first glance or superficial thought, lend themselves to the diagnosis of globus hystericus or a neurosis of one kind or another. A study of the sensory and other neural pathways supplying the pharynx and adjacent structures would disclose that there is a logical explanation for many of these symptoms. This is particularly true in reference to the common complaint of a "lump in the throat."

An effort to define the term "throat" properly and a general discussion of certain observations over a quarter of a century will be presented.

COURSE 480

Room 706 Period W-2

HENRY B. PERLMAN, M.D.
Chicago

Fluid in the Middle Ear: Etiology and Management

Different kinds of fluid may be found in the middle ear and adjacent air cells. Each kind is associated with a particular pathogenesis. A clear understanding of the normal and pathologic physiology of the eustachian tube is essential to the interpretation of this group of ear diseases. The recognition of their more subtle changes and their relation to deafness is sometimes difficult. Careful observation of the natural course of the various disease states is also important in understanding indications and prospects of therapy. Experiences with some unusual cases seen during the past few years will be reviewed. A motion picture will be presented.

COURSE 481

Room 721 Period W-2

WALTER A. PETRYSHYN, M.D.
Montclair, N. J.

The Fractured Mandible

This course is designed for the otolaryngologist who may find it necessary to handle the problem of the fractured mandible. It will include:

1. Presentation of the surgical anatomy of the mandible and its occlusal relationship to the maxilla
2. Demonstration on specimens of basic techniques of interdental and arch bar wiring
3. Illustration and evaluation of some of the techniques used in the open reduction of the fractured mandible
4. Treatment of specific fracture problems

COURSE 482

Room 752 Period T-3 or W-3

BRUCE PROCTOR, M.D.
Detroit

Tympanoplasty

The combination of surgery for the control of middle ear inflammation and preservation or restoration of hearing is referred to as tympanoplasty. Hearing may be improved by reconstructing the sound mechanism for transmission of sound waves to the oval window and by restoration of sound protection for the round window.

The following aspects will be discussed: (1) surgical anatomy of the middle ear; (2) physiologic objectives; (3) analysis of the pathologic changes and status of the middle ear before and during the surgical procedure; (4) the techniques employed in the various types of tympanoplasty; (5) a critical survey of the results achieved; and (6) analysis of failures. If time permits, we will summarize the world literature on the latest developments on tympanoplasty.

COURSE 483

Room 752 Period Th-1

BRUCE PROCTOR, M.D.
Detroit

Surgical Anatomy of the Temporal Bone

The use of the modern operating microscope has necessitated reconsideration of the anatomy of the ear as seen under the magnification that we are working with at present. Particular attention will be paid to the minute structures in the middle ear which are frequently encountered and also some consideration will be given to the various anomalies. The surgical anatomy of the region of the windows, the sinus tympanicus, the epitympanum and the hypotympanum. The information will be correlated with the surgical anatomy previously used in temporal bone work.

COURSE 484

Room 733 Period Th-1

G. O. PROUD, M.D.
Shawnee-Mission, Kan.

Middle Ear Effusion

The etiologic factors involved in the genesis of middle ear effusion will be discussed, and the prognosis as it relates to these factors will be presented. Helpful methods of early recognition of the condition will be outlined, and a rational approach to therapy introduced.

The results of eustachian tube cultures and micropathologic studies of the middle ear mucosa will be used as scientific support of the material presented.

COURSE 485

Room 731 Period Th-3

WILLIAM F. RABBETT, M.D.
New York

Submucous Resection of the Nasal Septum

Surgical anatomy of the nasal septum and framework of the external nose will be reviewed.

A simplified technique for the surgical correction of the deviated nasal septum, as taught at the Manhattan Eye, Ear and Throat Hospital, will be presented.

Surgical management of the anterior deviated nasal septum with obstruction of the nares will be considered.

The relative importance of the septum in plastic surgery of the nose will be discussed.

COURSE 486

Room 722 Period T-2

AUBREY G. RAWLINS, M.D.
San Francisco

The Corticosteroids in Otolaryngology

I. Pituitary-adrenal axis described and pituitary-thyroid axis described.

  A. Modern concept of mechanism of action.

    1. No measurable ACTH in blood if normal.
    2. Contraindications to the use of corticoids and indications of their use.

  B. Short-term therapy vs. Long-term therapy.

    1. The dose varies with the individual.

II. We use these hormones in pharmacologic anti-inflammatory doses.

  A. Inflammation is in connective tissue.

    1. Connective tissue described.
    2. Inflammation described.

III. Numerous synthetic products vs. the older hormones.

  A. Worse side effect.

    1. Depression of pituitary-adrenal axis.
    2. More work along this line.

B. Hormones do not interfere with allergy testing while antihistaminics do.

C. The goal of the newer synthetic is to get more anti-inflammatory action and less exaggeration of hormonal effects.

D. The cortex is always secreting while medulla is not.

E. Amount of hydrocortisone secreted normally and the amount under strain.

F. Corticoids given by mouth.

1. Start anti-inflammatory action in one hour.
2. Reach peak action in two to four hours.
3. Action good for about six hours.
4. Diurnal variations described.

IV. Surgery and Corticosteroids.

A. What about doing surgery in patients who have been on or are on corticosteroids?

1. What to do if the patient has elective surgery
2. What to do if the patient has emergency surgery

V. Discussion of thyroid-stimulating hormone, estrogens and mass cells

VI. Specific conditions where corticosteroids should be used

VII. Exact dosage of corticosteroids

VIII. Recent experimental work with corticosteroids

COURSE 487

Room 733 Period W-3

GEORGE F. REED, M.D.
Boston

Neck Dissection

This course will attempt to present in a simplified, step-by-step fashion, a technique for routine radical neck dissection. The technique has been so organized as to make step-by-step approach feasible, easy to apply, and easy to remember. The various steps will be outlined and demonstrated in both still and motion picture photography.

COURSE 488

Room 740 Period T-1

HERBERT J. RINKEL, M.D.
Kansas City, Mo.

BY INVITATION

The Diagnosis of Food Allergy

PART I:

A. An evaluation of the function and limitations of history taking.

B. The use and value of skin tests.

C. Evaluation of the cytotoxic cell test.

D. The technique of the deliberate individual feeding test.

PART II:

An outline of the clinical application of one or more of the diagnostic techniques listed on Part I of this presentation. This procedure is especially tailored to meet the needs of the otolaryngologist.

COURSE 489

Room 733 Period W-1

HERBERT J. RINKEL, M.D.
Kansas City, Mo.

BY INVITATION

Diagnosis of Inhalant Sensitizations

PART I:

The Diagnosis of Inhalant Sensitization will be discussed in two parts.

A. History

B. Skin tests

Skin tests will evaluate the use of gradations in sensitivity and a delineation of some possible sources of error in such tests.

PART II:

A practical application of the results of the skin tests in correlation with the clinical picture. Various factors modifying therapy will be discussed in detail.

COURSE 490

Room 732 Period W-2

BERNARD J. RONIS, M.D.
Philadelphia

Pitfalls in Stapes Surgery

The surgical treatment of otosclerosis has advanced with variations in surgical techniques devised to correct the disease encountered at time of the stapes operation. Many operations are being performed with greater incidence of success. With the advent of surgical modifications of stapes operations, it is important to evaluate specific techniques to assess the successful and unsuccessful end results of this surgery. The indication for stapes surgery has a greater latitude than the operation for fenestration of the horizontal semi-circular canal. Indications and contraindications can be based on the clinical evidence of cochlear reserve.

Complications are infrequent but severe. Untoward reactions can occur from simple methods of mobilization to techniques of total stapedectomy. Pitfalls in the surgical techniques and treatment of the complications, otitis media, otitis externa, perilymphatic otorrhea, labyrinthosis, facial nerve paralysis, and eustachian tube dysfunction will be discussed. The probable causes and the prevention of immediate and delayed postoperative complications will also be reviewed.

COURSE 491

Room 732 Period T-2

SAMUEL ROSEN, M.D.
New York

When to Use the Different Techniques in Stapes Surgery

There is a wide range of pathologic changes to be found in otosclerotic ears, extending from the minimal to the maximal and containing many and varied gradations. In view of the variety and uniqueness of the structural conditions — both anatomical and pathological — there is no standard stapes surgical procedure to fit all cases. In modern stapes surgery we have a continuity of techniques applicable to the pathological findings which call for that specific operation which is unique for that specific stapes.

In the main, there have been two fundamental surgical approaches to the rigid stapes. The first and least radical is mobilization of the footplate with preservation of nature's functioning ossicular chain. Hearing has been improved and maintained at various levels up to normal, with closure of the air-bone gap, by these techniques, which are undergoing constant change and refinement. The other surgical approach consists in interruption of the ossicular chain and in certain procedures substituting artificial parts for portions of the chain to reestablish a columella effect. Among these more radical techniques is total stapedectomy. These techniques have similarly resulted in improved hearing and closure of the air-bone gap.

The guiding principle of stapes surgery should be one of **order:** that is, to try first the more conservative, least radical mobilization techniques and then to proceed successively, step by step as it becomes necessary, to the more radical techniques. Each attempt to achieve the best result should be exhausted before going on to the next step.

Total stapedectomy is an excellent operation, but the risks are known to include complete or severe cochlear deafness. Any assessment of the various techniques of stapes surgery must be measured not only by the degree of success in restoring and maintaining the hearing, but also by the risks involved for worsening it.

The principle of order in stapes surgery implies that we should **end with,** rather than begin with, total stapedectomy. The footplate, it appears, acts as a protector to the vestibule and, therefore, should be preserved wherever possible.

COURSE 492

Room 733 Period Th-2

ROBERT E. RYAN, M.D.
St. Louis

Headache: Differential Diagnosis and Treatment

The differential diagnosis and the treatment of various types of headache will be presented. Among types of headache to be discussed are migraine. histaminic cephalalgia, sinusitis, myalgia, tension headache, psychogenic, hypertensive headache, posttraumatic headache, and ocular or otic headache, as well as the mixed type.

Various new preparations for treating headache patients will be discussed and the results of treatment demonstrated. Many

of these drugs are still in the investigative stage, while others have been on the market for only a short period of time. The prophylactic and the symptomatic phases of the various types of headache will be discussed.

Techniques for recording the history of the headache patient and for routine examination will be outlined.

COURSE 493

Room 731 Period Th-2

WILLIAM H. SAUNDERS, M.D.
Columbus, Ohio

Oral Lesions: Treatment and Clinical-Pathologic Correlation

Two screens will be used on which to show slides of oral lesions and their corresponding microscopic sections (both in color). This presentation, which permits the audience to view slides of both the actual lesion and its color photomicrograph simultaneously, graphically portrays the clinical lesion and its behavioral characteristics.

Some of the lesions shown represent common oral diseases, the exact nature of which the practicing physician may have forgotten because of unfamiliarity with microscopic pathology. Other lesions represent diagnostic rarities which lend themselves well to clinical-pathologic correlation.

COURSE 494

Room 721 Period W-1

EUGENE W. SCHELDRUP, M.D.
Iowa City

BY INVITATION

Applied Anatomy of the Neck

The anatomy of those regions of the neck that are most commonly invaded surgically by the otolaryngologist will be discussed and visualized through the medium of appropriate lantern slides and chalk sketches. Special attention will be devoted to those few but significant anatomic relationships and landmarks which not only facilitate proper orientation of the surgeon in the various regions discussed but also aid in the prevention of damage to the important neurovascular (and other) structures contained therein. Surgical approaches to the various regions will be emphasized. Practical aspects will keynote the entire discussion.

COURSE 495

Room 711 Period W-1

WOODROW D. SCHLOSSER, M.D.
Philadelphia

BY INVITATION

Surgery of Chronic Otitis Media and Mastoiditis

Today, the surgical treatment of chronic otitis media and mastoiditis belongs in the realm of otologic microsurgery. In this course, modern concepts of tympanoplasty and mastoid surgery will be reviewed and evaluated.

As a basis for this discussion, the classification system and surgical techniques of Wullstein as well as other concepts and procedures, such as using external canal skin or a vein graft for reconstructing a tympanic membrane, will be considered. The efficacy of these techniques will be evaluated with respect to the particular pathologic changes encountered.

In addition, newer techniques for obliterating the mastoid bowl will be presented. Two variations of this concept will be discussed: the anterior-posterior approach with primary skin grafting, and mastoid cavity obliteration after the external canal and mastoid bowl have been joined with secondary skin grafting of the canal.

The presentation will be illustrated with slide transparencies taken through the operation microscope.

COURSE 496

Room 752 Period W-2

HAROLD F. SCHUKNECHT, M.D.
Boston

Stapedectomy for Otosclerosis

The stapes replacement operation, using metal and soft tissue, has been used in

several hundred cases. The operative procedure consists of the following steps:

1. Appropriate exposure of the posterior mesotympanum by using the usual transtympanic approach.
2. Disarticulation of the incudostapedial joint and removal of the head, neck and crura of the stapes.
3. Removal of the mucosa from the footplate and from the oval window niche.
4. Removal of a small bit of connective tissue and/or adipose tissue from the ear lobe or postauricular area.
5. Creation of the graft prosthesis.
6. The footplate of the stapes is removed with hooks, chisels and appropriate burrs.
7. The graft prosthesis is introduced, placing the tissue in the oval window and the hook over the incus.

COURSE 497

Room 733 Period Th-3

HAROLD F. SCHUKNECHT, M.D.
Boston

Removal and Preparation of the Human Temporal Bone

The acquisition of fresh human temporal bones continues to be an important adjunct to the training and research activities in departments of otolaryngology. Specimens are needed to show the pathological changes underlying different types of vertigo and deafness.

Temporal bones are also needed as fresh specimens for teaching otologic surgery. Otologic surgery is performed almost entirely with the operating microscope and considerable practice is required to manipulate delicate instruments in this magnified visual field. Such skill can be acquired only by anatomic dissection and surgical exercises on the fresh human temporal bone.

There is an abundant supply of fresh human temporal bones in the autopsy room. After removing the brain with care so as to avoid avulsing the eighth cranial nerve, the temporal bones are removed with either the chisels or the bone plug cutter.

A motion picture and lantern slides will be shown demonstrating the details of the technique for removing the temporal bones, suggestions will be offered how best to preserve them, and information will be provided as to the best techniques for histological preparation of the ears.

COURSE 498

Room 731 Period W-1

LYLE M. SELLERS, M.D.
Dallas

Headache: Its Otorhinologic Causes and Cure

Although not given as a continuous course, this course is arranged to supplement Course 499. Either course may be taken individually, as each is complete in itself, or either one may be taken first if both are desired.

Otorhinologic literature of recent times is so replete with discussions of headache not of otorhinologic origin that headache of true otorhinologic origin either is being overlooked or neglected in our present clinical considerations, to the damage of the patient and of otorhinology. It is still a prime subject for our attention, and as such it forms the subject of this course.

There are many definite causes of true otorhinologic headache, each producing its own definite type of headache. Each cause and its clinical manifestations will be defined, described and correlated anatomically and physiologically, so that exact diagnosis of these headaches of otorhinologic origin as well as those of non-otorhinologic origin may be made and the appropriate specific treatment applied. The course will be thoroughly outlined, illustrated by slides and documented by actual cases diagnosed and treated.

COURSE 499

Room 752 Period Th-3

LYLE M. SELLERS, M.D.
Dallas

Dizziness: Its Cure or Relief

Although not given as a continuous course, this course is arranged to supplement Course 498. Either course may be

taken individually as each is complete in itself, or either one may be taken first if both are desired.

The practical, simple and direct methods for the cure or the relief of dizziness as developed by many years' practice in this field of otology are offered in this course.

Only enough of the anatomy and physiology of the vestibular labyrinth will be given to assure understanding of the clinical tests. The tests themselves, when divested of the theoretical adventitia, actually are very easily performed and interpreted.

Because the particular type of dizziness or dysfunction must be identified before successful treatment can be instituted, differential diagnosis will be stressed.

When identification of the cause is accomplished, the proper treatment evolves logically and easily. It is this phase of the problem that will be emphasized by the discussion of actual cases with their problems in diagnosis and successful treatment.

Ample time for questions and answers will be allowed.

COURSE 500

Room 724 Period W-3

BEN H. SENTURIA, M.D.
BENARD C. ADLER, M.D.
St. Louis

What's New in the Treatment of External Otitis?

A brief review of the histology, pathology, bacteriology, and chemistry of external otitis will be presented. The major portion of the course will deal with treatment and will stress the details of office management of the common types of external otitis. Differential diagnosis will be emphasized as it relates to treatment. Problem cases will be discussed, but emphasis will be directed to the every-day handling of the usual types of cases.

COURSE 501

Room 752 Period T-2

GEORGE E. SHAMBAUGH, JR., M.D.
Chicago

Surgical Applications of the Mechanism of the Middle Ear

The middle ear is a mechanical device for overcoming the air-water-sound barrier. It does this by sound pressure transformation for the oval window with sound protection for the round window. Each pathologic lesion of the outer and middle ear produces its characteristic pattern of audiometric impairment and each requires a particular surgical technique for the deliberate reconstruction of an effective mechanical device. Surgical techniques for improving the hearing in osteoma of the meatus, fibrous atresia of the meatus, bony atresia of the meatus, various malformations of the ossicular chain, otosclerotic stapes fixation, traumatic interruption of the ossicular chain, and the various types of middle ear changes following suppurative diseases will be described with illustrative case reports and hearing results.

COURSE 502

Crystal Room Period T-3

JOHN J. SHEA, M.D.
Memphis

Fenestration of the Oval Window

This operation is a combination of the best features of fenestration of the lateral semicircular canal and mobilization of the stapes. It was developed for those cases in which the otosclerotic invasion of the stapes was so extensive that the ordinary methods of mobilization were not effective. When the invasion of the stapes is widespread, then the arch of the stapes is removed and the mucoperiosteum is carefully taken away for a distance of about one millimeter surrounding the oval window. As much of the footplate as possible is then removed, using sharp picks and special stainless steel fistula hooks or a very small cutting burr in the contra-angle handpiece. The fenestra is then covered with a short length of vein graft removed from the back of the hand, with the intima side upward and the adventitia side downward toward the fenestra. The sound conducting mechanism is then rebuilt with a short length of polyethylene 90 tubing which is placed between the center of the vein graft and the lower end of the incus.

The results to date with this new operation have been very encouraging.

COURSE 503

Room 721 Period T-1

EMANUEL M. SKOLNIK, M.D.
Chicago

Electrodiagnosis in Facial Nerve Paralysis

The purpose of this course is to discuss in detail electrodiagnostic techniques for the scientific assessment of the status of facial nerve paralysis. The merits of the faradic-galvanic tests and electromyography relative to the conservative and surgical management of facial paralysis will be presented.

COURSE 504

Room 740 Period Th-2

EMANUEL M. SKOLNIK, M.D.
Chicago

Velo-Pharyngeal Inadequacy

The multiple physical factors that contribute to the speech disorder in the patient with a cleft palate must be altered by surgical or nonsurgical means so that the patient can assume his place in society with full responsibilities. This entails a carefully designated, integrated program, striving toward a common goal of effective care on a longitudinal basis to achieve adequate functional and cosmetic results.

The status of a patient with a cleft of the lip and palate is considered from a many dimensional viewpoint.

Indications for the various repairs will be covered, with special reference to pharyngeal flap. The problem of hearing deficit and adenoidectomy and tonsillectomy will be included.

This presentation will be demonstrated by the use of slides.

COURSE 505

Room 740 Period Th-1

MARTIN SPECTOR, M.D.
Philadelphia

Dizziness: Differential Diagnosis

The history and examination will be approached from the viewpoint of the otologist in his office. Details of the history and examination will be discussed, and their significance stressed. An orderly outline for taking the history will be presented. Steps in the examination will be described. Postural vertigo and nystagmus will be stressed particularly, since they are so often missed. Criteria for consultations, roentgenograms, and laboratory tests will be discussed.

COURSE 506

Room 734 Period Th-1

JOSEPH A. SULLIVAN, M.D.
J. BRYDON SMITH, M.D.
KENNETH McASKILE, M.D.
Toronto, Ont., Canada

Facial Palsies and Their Treatment

Recent interest in stapes mobilization, tympanoplasty and myringoplasty has forced the otologist to adopt magnification in order to carry out these procedures.

It is hoped that such magnification will reduce the number of postoperative facial palsies. However, despite all precautions, accidents can and do happen. This course is designed to advise the otologist when and how to decompress the facial nerve and the correct method of doing so. The variations of facial nerve repair and their end results will be discussed.

COURSE 507

Room 738 Period T-3
or or
Room 752 Period W-1

HAROLD G. TABB, M.D.
New Orleans

Closure of Tympanic Membrane Perforations with Vein Grafts

Several methods of closing tympanic membrane perforations with autogenous vein grafts will be presented in this course. Vein grafts, which were first introduced in ear surgery by Shea, have been found to produce a high percentage of successful

closures in eardrum perforations and, in the author's opinion, are superior to skin for this purpose.

Lantern slides and motion pictures will be used to demonstrate detailed technique.

COURSE 508

Room 728 Period T-3

JUERGEN TONNDORF, M.D.
Iowa City

Patho-Physiology of Bone Conduction and its Clinical Implications

Understanding of the patho-physiology of bone conduction is essential for the evaluation of (clinical) bone-conduction tests. This course proposes, therefore, to present the current physiological concept of cochlear stimulation by skull vibrations. Bone-conduction response is a complex phenomenon. There are two main modes, inertial and compressional so-called. The effect of occlusion of the cochlear windows, as seen in otosclerosis, upon both of these components will be discussed in the light of older (classical) and newer experimental studies. Several clinical implications as to the outcome of clinical bone-conduction tests will become obvious in this discussion.

COURSE 509

Room 715 Period W-1

NICHOLAS TOROK, M.D.
Chicago

Technique of Nystagmography

The vestibular examination is one half of the task when the function of the ear has to be evaluated. The most reliable audiogram alone is often insufficient when the function of the ear is to be analyzed. Testing of hearing has come a long way from the time of complete dependence on tuning forks and the whispered voice. Vestibular testing methods remained unaltered for almost a half century. Objective recording of the nystagmus and graphic representation of the vestibular activity may be compared to the introduction of the audiometer in hearing measurement. Nystagmography today is a simple procedure applicable to the clinic or the office. For the last ten years, since nystagmus has been recorded more and more widely, new vistas have been opened for the study of vestibular physiology and pathology.

The simple technique of nystagmography and the application and significance of its use in practice will be demonstrated and discussed.

COURSE 510

Room 715 Period Th-1

NICHOLAS TOROK, M.D.
Chicago

Evaluation of the Nystagmogram

The nystagmogram is an objectively recorded nystagmus obtained by a standardized vestibular stimulation (thermic, rotatory, or postural). It provides reliable information of vestibular sensitivity on one hand, and can enlighten certain aspects of central nervous system function on the other. It became evident that the data of poststimulatory nystagmus duration obtained through unaided observation is insufficient for proper evaluation of the function.

The following phenomena and their variations are obtainable by reading the nystagmogram:

1. Duration of the poststimulatory nystagmic reaction
2. The frequency and maximum frequency (culmination phenomenon)
3. The frequency as it changes along the entire reaction — the so-called "frequency pattern"
4. The speed of the slow component
5. The variation of the nystagmus amplitude
6. Differentiation between vestibular nystagmus and non-nystagmic eye movements that the unaided observer cannot possibly differentiate

Sample recordings will illustrate the various details, which are familiar and useful findings for the nystagmus investigator.

COURSE 511

Room 740 Period T-3

WILLIAM M. TRIBLE, M.D.
Washington, D. C.

Minimizing Deformity in Tumor Surgery of the Head and Neck

Modern block resection for most tumors of the head and neck are so extensive that little improvement in the cure rate can be expected by widening the operative field. Progress lies in combining the surgery with chemotherapy and radiotherapy, and in methods to minimize the deformities. Lesser excisions can often be performed, and preserving even a portion of the larynx, mandible, recurrent laryngeal nerve, or facial nerve lessens deformity. Preoperative radiotherapy has been advocated to permit these less mutilating procedures.

With well-planned incision and knowledgeable use of flaps, grafts, and stents, almost all defects can be closed primarily without constructing pharyngostomes, and secondary contractures can be avoided. Where necessary, tubed pedicles can be elevated before or with the excisional surgery. In resections of the anterior mandible, collapse of the tissues can be avoided by fixation of the fragments, allowing an adequate bed for bone grafting. Epithelial inlay grafts permit the recreation of the buccal sulcus, aiding the fitting of the prostheses.

COURSE 512

Room 732 Period Th-2

O. E. VAN ALYEA, M.D.
Chicago

Sinusitis: Modern Trends in Management

Persistence of a sinus infection implies inadequate drainage. Factors contributing to impairment of drainage may be local or systemic. The local factors may be structural or pathologic, and in some cases the sinusitis is maintained by a combination of contributing causes.

The goal of the rhinologist is to eliminate the causative factors while treating the infection.

Seldom is the radical removal of sinus mucosa in the treatment of sinusitis indicated, and it should be undertaken with the understanding that only temporary relief may be expected and that a return of the symptoms, even more pronounced than formerly, may ensue.

In this course the techniques of various therapeutic measures used successfully in the management of sinus disease will be discussed in detail.

COURSE 513

Room 724 Period T-2

HANS von LEDEN, M.D.
and
PAUL MOORE, Ph.D.
BY INVITATION
Chicago

Current Trends in Office Laryngology

Most patients consult the laryngologist for one of two reasons: throat pain or hoarseness. For many years organic lesions of the larynx have monopolized the interest of the laryngologist, but the current emphasis on communications directs our attention to the far more common cases of functional hoarseness.

In this course we will stress laryngeal disorders which are the result of faulty vocal use. The diagnosis of these disorders will be presented with emphasis on new additions to office equipment, such as the electronic laryngostroboscope. The role of the physician in the management or supervision of vocal rehabilitation will be discussed.

COURSE 514

Room 706 Period T-1

LINDEN J. WALLNER, M.D.
Chicago

Surgery of the Tonsils and Adenoids

As this is the commonest operation performed by many otolaryngologists, any refinements are welcome that contribute to its safety and effectiveness.

Subjects to be discussed include: (1) the modern indications in light of the opposition or ultra conservatism of many pediatricians; (2) the relation to allergy and poliomyelitis; (3) adequate preoperative examination, including effective methods of discovering bleeding tendencies; (4) the choice of anesthesia and merits of intubation.

The technique of tonsillectomy and adenoidectomy in the "head low" position with the tongue blade suspended from the Killian gallows will be depicted by a 20-minute motion picture. The advantages and drawbacks of direct vision adenoidectomy will be reviewed.

Also mentioned are means of controlling bleeding, of determining total blood volume, the importance of accurately measuring blood loss at operation, and the indications for blood replacement.

COURSE 515

Room 715 Period W-2

DE GRAAF WOODMAN, M.D.
New York

Vocal Cord Surgery

Techniques for the correction of the obstructed glottic airway caused by laryngeal paralysis secondary to the complications of thyroid surgery as well as bulbar and peripheral types of paralysis will be presented.

The use of keels and acrylic molds for the correction of webs and glottic stenosis will be demonstrated.

Voice rehabilitation through surgical therapy combined with speech therapy will be shown.

All techniques will be demonstrated with the aid of color motion pictures with sound and slides.

The Following are Condensed Schedules of Courses Previously Described

CONTINUOUS COURSES — OPHTHALMOLOGY

COURSE NO.	SPEAKER	SUBJECT	PERIODS
1	Allen et al.	Bacteriology & Infectious Diseases	8 PERIODS M-4, M-5, T-4, T-5 W-4, W-5, Th-4, Th-5
2	Ascher	Aqueous Veins in Glaucoma	2 PERIODS M-4, M-5
3	Ballintine & Purnell	Clinical Tonography	2 PERIODS W-5, W-6
4	Becker & Kinsey	Studies of Aqueous Flow	2 PERIODS T-4, T-5
5	Bedell	Ophthalmoscopy	3 PERIODS M-4, T-4, W-4
6	Berliner	Recent Advances in Biomicroscopy	3 PERIODS M-6, T-6, W-6
7	Boeder	Practical Optics	2 PERIODS Th-4, Th-5
8	Braley	Fundus Lesions	2 PERIODS W-5, W-6
9 or 10	Brockhurst & Regan, C.	Indirect Ophthalmoscopy	3 PERIODS M-4, M-5 Choice of T-4, T-5, T-6 or W-5, W-6 Choice of Th-4, Th-5, Th-6
11	Brown et al.	Eye Muscles	8 PERIODS M-4, M-5, T-4, T-5 W-4, W-5, Th-4, Th-5
12	Byrnes	Ophthalmic Filters	2 PERIODS T-5, T-6
13	Callahan et al.	Ophthalmic Plastic Surgery: Fundamentals	9 PERIODS M-5, M-6, T-5, T-6, W-5, W-6, Th-4, Th-5, Th-6
14	Castroviejo et al.	Keratoplasties	6 PERIODS W-4, W-5, W-6 Th-4, Th-5, Th-6
15	Clark, G.	Retinal Detachment	3 PERIODS M-6, T-6, W-6
16	Constantine et al.	Contact Lenses	6 PERIODS T-4, T-5, W-4 W-5, Th-4, Th-5
17	Cooper	Principles of Ocular Muscle Surgery	2 PERIODS M-5, M-6
18 or 19	Copeland	Streak Retinoscopy	4 PERIODS M-4, M-5, T-4, T-5 or W-4, W-5, Th-4, Th-5
20	Costenbader	Muscle Problems	2 PERIODS M-4, M-5
21	DeVoe et al.	Reconstructive Surgery of the Lids & Conjunctiva	3 PERIODS Th-4, Th-5, Th-6
22	Ferrer	Contact Lenses	2 PERIODS Th-4, Th-5
23	Fonda & Sloan	Subnormal Vision	2 PERIODS M-4, M-5
24	Friedman	Binocular Indirect Ophthalmoscopy	2 PERIODS M-6, T-6

CONTINUOUS COURSES — OPHTHALMOLOGY

COURSE NO.	SPEAKER	SUBJECT	PERIODS
25	**Gibson et al.**	Surgery of Heterotropia	4 PERIODS T-5, T-6, W-5, W-6
26	**Girard & Fletcher**	Pleoptics	2 PERIODS M-5, M-6
27	**Hughes et al.**	Ophthalmic Plastic Surgery: Advanced	9 PERIODS M-4, M-5, T-4 T-5, W-4, W-5 Th-4, Th-5, Th-6
28	**Iliff et al.**	Ptosis	3 PERIODS W-4, W-5, W-6
29	**Jampolsky**	Management of Esodeviations	2 PERIODS Th-5, Th-6
30	**Jardon & Laubheimer**	Fitting Ocular Prostheses	2 PERIODS W-5, W-6
31	**Jones, L.**	The Lacrimal Apparatus	2 PERIODS W-5, W-6
32	**Knighton et al.**	Practical Essentials of Glaucoma	9 PERIODS M-4, M-5, M-6 T-4, T-5, T-6 W-4, W-5, W-6
33	**Kuhn et al.**	Industrial Ophthalmology	3 PERIODS T-4, W-4, Th-4
34	**Leinfelder et al.**	Diagnostic Aids in Neuro-ophthalmology	3 PERIODS Th-4, Th-5, Th-6
35	**Lemoine et al.**	Fundus Lesions	3 PERIODS M-4, M-5, M-6
36	**Linksz**	Physiology of Vision	2 PERIODS M-4, M-5
37	**Lloyd**	Diseases of the Cornea	2 PERIODS M-4, M-5
38	**Masters, R., et al.**	Slit Lamp Biomicroscopy: Fundamentals	9 PERIODS M-4, M-5, M-6 T-4, T-5, T-6 W-4, W-5, W-6
39	**McLean et al.**	Practical Factors in Eye Surgery	4 PERIODS M-4, M-5, T-4, T-5
40	**Parks & Albert**	Eso-Deviations	4 PERIODS W-5, W-6, Th-4, Th-5
41	**Pierce et al.**	Retinal Detachment	6 PERIODS M-4, M-5, T-4, T-5 W-4, W-5
42	**Posner & Gorin**	Office Gonioscopy	2 PERIODS Th-5, Th-6
43	**Prewitt**	Diagnosis & Therapy of Ocular Allergy	2 PERIODS W-5, W-6
44	**Reese et al.**	Clinical Aspects of Ocular Tumors	3 PERIODS T-4, T-5, T-6
45	**Roberts**	Glaucoma	2 PERIODS M-4, M-5
46	**Rolett**	Gonioscopy	2 PERIODS W-4, W-5
47	**Romaine**	Refraction Problems & Treatment	3 PERIODS M-6, T-6, W-6
48	**Romaine**	Ocular Motility Surgery	4 PERIODS M-4, M-5, T-4, T-5

SECTION ON INSTRUCTION

ADVANCE ORDER SHEET

All courses cost $2.00 for each period (one hour). Follow instructions explicitly and check for errors in listing before mailing.

Orders will not be accepted for presale after September 28. To ensure acceptance they should be mailed before September 26 to

WILLIAM L. BENEDICT, M.D., *Executive Secretary-Treasurer*
American Academy of Ophthalmology and Otolaryngology
15 Second Street S.W., Rochester, Minnesota

Academy Candidates and Guests May Purchase Tickets ONLY at Instruction Desk in Registration Foyer

(Over)

ADVANCE ORDER SHEET

ORDERS FILLED ONLY IF CURRENT DUES ARE PAID

NO REFUNDS WILL BE MADE AFTER OCTOBER 2

(Type or Print) Last Name First Name Middle Initial

Office Address

City Zone State

Days to be Present

- ☐ Monday
- ☐ Tuesday
- ☐ Wednesday
- ☐ Thursday

Total Amount Enclosed $_____

SELECTION OF COURSES ON REVERSE SIDE OF THIS BLANK

RECAPITULATION OF GENERAL INSTRUCTIONS

1. Monday, Tuesday, Wednesday, and Thursday are represented by the letters M, T, W, Th. The first period in the morning is represented by figure 1, second period by figure 2 and third period by figure 3. The first period in the afternoon is represented by figure 4, second period by figure 5, and third period by figure 6. All courses in otolaryngology and maxillofacial surgery are presented in the mornings. All courses in ophthalmology are presented in the afternoons.

2. Reservation of instruction tickets in advance of the meeting will be made ONLY for MEMBERS whose 1961 dues have been paid. ACADEMY CANDIDATES AND GUESTS MAY MAKE SELECTION OF COURSES *ONLY* AT THE GENERAL REGISTRATION DESK IN CHICAGO.

3. Make check payable to W. L. Benedict, M.D.

4. Mail order promptly to ensure reservation of first choices. If necessary, an attempt will be made to rearrange schedule to include "first choices."

(Over)

SELECTION OF COURSES

PERIOD		FIRST CHOICE		SECOND CHOICE		THIRD CHOICE	
		Course No.	Lecturer	Course No.	Lecturer	Course No.	Lecturer
MON.	4						
P.M.	5						
	6						
TUES.	1						
A.M.	2						
	3						
P.M.	4						
	5						
	6						
WED.	1						
A.M.	2						
	3						
P.M.	4						
	5						
	6						
THURS.	1						
A.M.	2						
	3						
P.M.	4						
	5						
	6						

CONTINUOUS COURSES — OPHTHALMOLOGY

COURSE NO.	SPEAKER	SUBJECT	PERIODS
49	Rosenthal	Binocular Indirect Ophthalmoscopic Technique	2 PERIODS W-4, W-5
50	Rossby & Salvatori	Contact Lenses	2 PERIODS Th-5, Th-6
51	Ruedemann & Noell	Clinical Electroretinography	2 PERIODS W-5, W-6
52	Ruedemann et al.	Practical Aspects of Contact Lens Fitting	6 PERIODS M-4, M-5, T-4 T-5, T-6, W-4
53	Schepens	Recent Advances in Retinal Detachment	3 PERIODS T-6, W-6, Th-4
54	Schimek & Bousquet	Clinical Gonioscopy & Tonography	2 PERIODS Th-4, Th-5
55	Schlaegel & Hungerford	Uveitis	2 PERIODS Th-4, Th-5
56	Schlossman & Priestley	Pleoptics	2 PERIODS T-5, T-6
57	Sloane	School Vision Testing	2 PERIODS T-4, T-5
58	Sloane	Telescopic Lenses	2 PERIODS W-4, W-5
59	Gettes	A. Prescription of Prisms B. Drugs in Refraction	2 PERIODS Th-4, Th-5
60	Steinmetz et al.	Ocular Emergencies	3 PERIODS M-4, M-5, M-6
61	Stow & Moss	Diagnostic & Therapeutic Office Procedures	2 PERIODS M-5, M-6
62	Theobald et al.	Histopathology	12 PERIODS M-4, M-5, M-6, T-4 T-5, T-6, W-4, W-5 W-6, Th-4, Th-5, Th-6
63	Thorpe & Berman	Intraocular Foreign Bodies	2 PERIODS W-4, W-5
64	Thorpe et al.	Advances in Slit Lamp Biomicroscopy & Applanation Tonometry	3 PERIODS Th-4, Th-5, Th-6
65	Thorpe et al.	Slit Lamp Gonioscopy	6 PERIODS M-4, M-5, M-6 T-4, T-5, T-6
66	Townes	Cataract Surgery	2 PERIODS Th-4, Th-5
67	Troutman et al.	Recent Advances in Ophthalmology	8 PERIODS M-5, M-6, T-5, T-6 W-5, W-6, Th-5, Th-6
68	Troutman	Enucleation Surgery	2 PERIODS Th-5, Th-6
69	Wadsworth & Colyear	Retinal Detachment	4 PERIODS M-6, T-6, W-6, Th-6
70	Wheeler & Knapp	Concomitant Strabismus	4 PERIODS T-5, T-6, W-4, W-5
71	Wise	Retinal Diseases	2 PERIODS Th-4, Th-5
72	Home Study Course Discussion Periods		12 PERIODS M-4, M-5, M-6, T-4 T-5, T-6, W-4, W-5 W-6, Th-4, Th-5, Th-6

SCHEDULE OF INDIVIDUAL COURSES—OPHTHALMOLOGY—Monday

Key M-4 — 2:00 p.m. to 3:00 p.m.

Course No.	SPEAKER	SUBJECT
103	Alvis	Glaucoma Surgery
122	Calhoun	Epithelization of the Anterior Chamber
125	Cassady	Toxoplasmic Retinochoroiditis
132	Cohoe	Reading Instruction for Partially Seeing Children
143	Diskan	Eye Screening in Schools
150	Everett	Retinal Detachment
151	Fernandez	Beta Radiation in Pterygium Surgery
156	Frayer	Retained Lens Protein After Operation & Trauma
171	Hilding	Practical Analysis of Mechanics of Vitreous Motion
178	Joy	Chronic Glaucoma
192	Leopold & Apt	Chemotherapy
199	MacLean	Cataracts
220	Perera	Retinal Detachment
221	Pfeiffer & Jones, I.	Roentgenography of the Eye & Orbit
231	Rychener	The Lacrimal Apparatus
235	Scarney	Slit Lamp Biomicroscopy
236	Scheie	Congenital Glaucoma

Key M-5 — 3:15 p.m. to 4:15 p.m.

Course No.	SPEAKER	SUBJECT
107	Bahn	Orbital Disease
121	Buxton	Total & Partial Keratectomies
131	Cleasby	Iris Tumors
141	Day	Medical Exophthalmos
144	Duke	Lesions of the Lids
146	Dunlap	Divergence Anomalies
149	Ellis	Removal of Intraocular Foreign Bodies
164	Gipner	Recent Advances in Ophthalmic Surgery
165	Givner	Ophthalmo-Iatrogenic Disorders
225	Reese	Cataract Extraction
230	Rundles	Streak Retinoscopy
240	Simpson	Hemorrhage into the Vitreous
245	Spaeth, P., & Carmichael	Ocular Tumors

Key M-6 — 4:30 p.m. to 5:30 p.m.

Course No.	SPEAKER	SUBJECT
102	Allen, H.	Aseptic Technique in Ophthalmology
123	Carroll	Optic Nerve Lesions
129	Cholst	Central Fields
137	Cunningham	Types of Head Pain
139	Daily	Biomicroscopy of Vitreous & Fundus Oculi
142	DeVoe	Surgery of Trauma
152	Fink, W.	Binocular Problems in Routine Refraction
155	Fox	Senile Ectropion & Entropion
163	Gifford	Local Anesthesia with Special Reference to Deep Motor Block
167	Haik	Mechanics of Intracapsular Cataract Extraction
170	Henderson	Intracranial Arterial Aneurysms
173	Hunt	Problems in Accommodation
174	Jacobson	Electroretinography
179	Kasper	Dacryocystorhinostomy
185	Kornzweig	Clinical Embryology
200	Mangold	Proper Fitting of Glasses
249	Tassman	Eye Involvement in Systemic Diseases
250	Theodore	Ocular Therapeutics
255	Veirs	External Dacryocystorhinostomy & Corrective Procedures for Epiphora
257	Weisser	Repair of Corneal Injuries
258	Wendland	Magnetic Intraocular Foreign Bodies

SCHEDULE OF INDIVIDUAL COURSES—OPHTHALMOLOGY—Tuesday

Key T-4 — 2:00 p.m. to 3:00 p.m.

Course No.	SPEAKER	SUBJECT
104	Andrew	Eye Diseases in Children
111	Berke	Various Lid Procedures
114	Block	Office Practice of Ophthalmology
120	Buesseler & Keats	Ophthalmic Radiology
122	Calhoun	Epithelization of the Anterior Chamber
124	Cassady	Dacryocystitis & Lacrimal Drainage
148	Egan	Cross Cylinder
153	Fink, W.	Vertical Muscle Surgery
157	Fread	Ideal Refraction Equipment
166	Hague et al.	Local & General Anesthesia in Ophthalmology
189	Leinfelder	Perimetry & Use of Tangent Screen
193	Lepard	Eye Diseases Common to Children
202	Mann, W.	Interpretation of Functional Visual Impairment
213	Naquin	Dislocation of the Lens
226	Regan, E.	Cataract Surgery
229	Ruedemann	The Differential Diagnosis & Surgical Correction of Vertical Muscle Defects
242	Smith, J. L.	Neuro-ophthalmology
244	Spaeth, E.	Complicated Ptosis
260	Wood	Macular Lesions
261	Young & Dixon	Contact Lenses

Key T-5 — 3:15 p.m. to 4:15 p.m.

Course No.	SPEAKER	SUBJECT
108	Bannon	Aniseikonia
113	Bettman	Value of Goniotomy
130	Clark, W.	Surgery of Ocular Muscles
140	Davis	Sutures in Cataract Surgery
146	Dunlap	Divergence Anomalies
160	Gartner	Fundus Diseases
162	Gibbons	Educational Management of Partially Seeing Children
182	Kennedy	Ocular Manifestations of Systemic Diseases
188	Leahey	Corneal Transplantation
191	Leopold	Advances in Ophthalmic Therapy
211	Morrison	Glaucoma
218	Paton	Corneal Surgery
222	Pico	Dacryocystorhinostomy
241	Smith, B.	Fractures of the Orbit
253	Uihlein & Kerr	Management of Head & Face Pains

Key T-6 — 4:30 p.m. to 5:30 p.m.

Course No.	SPEAKER	SUBJECT
133	Coles	Office Management of Uveitis
139	Daily	Biomicroscopy of Vitreous & Fundus Oculi
158	Fry	Inflammatory & Degenerative Lesions at Posterior Pole of the Eye
161	Gemeroy	External Diseases
164	Gipner	Recent Advances in Ophthalmic Surgery
177	Johnson, C. C.	Ptosis
194	Levy	Practical Uses of Contact Lenses
205	Martens & Dyer	Special Occupational Problems in the Presbyopic Patient
206	McCannel	Efficiency in the Office
207	McGraw	Contact Lenses
210	Merriam	Radiotherapy in Ophthalmology
212	Murrah	Aids for Subnormal Vision
227	Rizzuti	Tumors of the Lids & Ocular Adnexa
232	Salleras	Corneal Surgery
233	Samuels	Pathological Sections for the Clinician
234	Sarrail	Plastic Lid Surgery
247	Sutliff	Practical Fitting of Corneal Lenses
252	Truhlsen	Home Orthoptics
254	Vail	Senile Cataract

SCHEDULE OF INDIVIDUAL COURSES—OPHTHALMOLOGY—Wednesday

Key W-4 — 2:00 p.m. to 3:00 p.m.

Course No.	SPEAKER	SUBJECT
105	**Asbury**	Practical Genetics in Everyday Office Practice
116	**Bonaccolto**	Enucleation Techniques
118	**Breakey**	Rehabilitation in Ophthalmology
119	**Breinin**	Electromyography
124	**Cassady**	Dacryocystitis & Lacrimal Drainage
126	**Chamberlain**	Vertical & Horizontal Components of Strabismus
128	**Chandler**	Surgical Complications of Glaucoma
135	**Coston**	Inflammatory & Degenerative Diseases of the Retina
138	**Cusick**	Ptosis Surgery
145	**Dunlap**	Accommodative Esotropia
169	**Hedges**	Headache
175	**Jaeckle**	Nonstrabismic Motor Abnormalities
176	**Jobe**	Ophthalmic Instruments
189	**Leinfelder**	Perimetry & Use of the Tangent Screen
190	**Lennon**	Angle Closure Glaucoma
196	**Lloyd**	Fundus Lesions of the Senile Eye
201	**Mann, M.**	Neurologic Disorders of Motility
243	**Spaeth, E.**	Surgery of Horizontal Duction Defects
246	**Sugar**	Classifications of Glaucoma
256	**Weingeist**	Lacrimal Sac Surgery

Key W-5 — 3:15 p.m. to 4:15 p.m.

Course No.	SPEAKER	SUBJECT
101	**Aebli**	End Results of Muscle Surgery
109	**Bannon**	Practical Aspects of Multifocal Corrections
110	**Belmont**	Refraction
127	**Chamlin**	Perimetry
134	**Colyear**	Problems with Light Therapy
159	**Galin**	Osmotic Therapy in Ophthalmology
180	**Katz, D.**	Ophthalmic Anatomy
184	**Klien**	Clinical Pathology of the Retina
207	**McGraw**	Contact Lenses
208	**McGuire**	Cataract
219	**Paulson**	Lighting for Comfortable & Accurate Seeing
224	**Potts**	Ophthalmic Toxicology

Key W-6 — 4:30 p.m. to 5:30 p.m.

Course No.	SPEAKER	SUBJECT
106	**Ascher**	Cyclodialysis
112	**Bettman**	Radioactive Isotopes
117	**Brav**	Serous Choroidal Detachment
168	**Halberg**	Tear Formation
181	**Katz, I.**	Common Eye Diseases of Dogs & Their Therapy
186	**Kronenberg**	Practical Ocular Therapeutics
187	**Kronfeld**	Present Trends in Ocular Pharmacology
195	**Lewis**	Mechanical Visual Aids
198	**Lubkin**	Psychosomatic Aspects of Ophthalmology
204	**Marshall**	Differential Diagnosis & Treatment of Infections of Lids
209	**McLean**	Selection of Surgical Procedures
214	**Newell & Goren**	Radioactive Isotopes in Ophthalmology
215	**Ogle**	Stereopsis
239	**Simonton**	Orbital Surgery
248	**Tait**	Heterophoric Asthenopta
253	**Uihlein & Kerr**	Management of Head & Face Pains
259	**Weston**	Astigmatism

SCHEDULE OF INDIVIDUAL COURSES—OPHTHALMOLOGY—Thursday

Key Th-4 — 2:00 p.m. to 3:00 p.m.

Course No.	SPEAKER	SUBJECT
115	**Bonaccolto**	Dacryocystorhinostomy
136	**Cowen**	Pool Gonioscopy
147	**Edwards**	Abnormal Effects of Prescribed Lenses on Extrinsic Muscles
154	**Forbes**	Cyclodiathermy
172	**Hill, H.**	Cataract Surgery
183	**King**	Lamellar Corneal Transplantation
186	**Kronenberg**	Practical Ocular Therapeutics
197	**Long**	Retinoblastoma & the Pseudoretinoblastomas
203	**Marks**	Electrical Currents Used in Ophthalmology
216	**Ogle**	Binocular Oculomotor Coordination & Imbalances
217	**Olson**	Iritis, Iridocyclitis, Keratitis
223	**Post**	Refinements of Refraction
228	**Rubin**	Aims in the Management of Squint
238	**Shipman**	Retinal Detachment Surgery
251	**Trent**	Progress in Ophthalmology

CONTINUOUS COURSES AND PANEL DISCUSSIONS
OTOLARYNGOLOGY

COURSE NO.	SPEAKER	SUBJECT	PERIODS
301	Anderson et al.	Rhinoplasty	2 PERIODS Th-1, Th-2
302	Baron	Tympanoplastic Procedures	2 PERIODS Th-1, Th-2
303 or 304	Conley & Lenz	Carcinoma of Head & Neck	2 PERIODS T-1, T-2 or W-1, W-2
305	Converse	Principles of Corrective Nasal Plastic Surgery	2 PERIODS T-2, T-3
306	Fox & Glorig	Noise in Industry	2 PERIODS T-2, T-3
307	Godlowski	I. Physiopathology of Endocrine System II. Enzymatic Mechanism of Allergy	2 PERIODS T-2, T-3
308	Godlowski	Endocrinopathies	2 PERIODS Th-2, Th-3
309	Guilford & Wright	Techniques of Tympanoplasty	2 PERIODS W-1, W-2
310	Hansel	Allergy & Medical Otolaryngology	2 PERIODS T-2, T-3
311	Harbert	Clinical Audiology	2 PERIODS T-1, T-2
312	Hardy & Hardy	Clinical Audiology for Children	2 PERIODS W-2, W-3
313	House, H., et al.	Reconstructive Surgery for Chronic Ear Disease	2 PERIODS W-1, W-2
314	Johnson, K., et al.	Emergencies in Otolaryngology	2 PERIODS Th-1, Th-2
315	Kazanjian et al.	Traumatic Injuries of the Face	2 PERIODS W-2, W-3
316	Lawrence	Acoustic Principles in Middle Ear Surgery	2 PERIODS W-2, W-3
317	Ogura & Som	Laryngeal Surgery	2 PERIODS Th-1, Th-2
318	Simonton et al.	What the Otologist Should Know About Hearing Aids	2 PERIODS T-2, T-3
319	Sisson et al.	Team Judgment in the Management of Head & Neck Cancer	2 PERIODS T-2, T-3
320	Som & Lewin	Reconstructive Procedure in Management of Head & Neck Tumors	2 PERIODS W-2, W-3
321	Walsh	What Can Be Done for Deafness	2 PERIODS Th-1, Th-2
322	Home Study Course Discussion Periods		3 PERIODS T-1, T-2, W-1

SCHEDULE OF INDIVIDUAL COURSES—OTOLARYNGOLOGY—Tuesday

Key T-1 — 9:00 a.m. to 10:00 a.m.

Course No.	SPEAKER	SUBJECT
401	Alexander	The Adenoid Problem
424	Compere	Radiologic Examination of Mastoid, Middle Ear & Eustachian Tube
428	DeWeese	The Problem of the Dizzy Patient
431	Farrior, J. B.	Tympanoplasty: Surgical Pathology & Technique
440	Furstenberg	Management of Nasal Obstruction
444	Goodhill & Harris, I.	Stapes Surgery: Perichondral Graft
448	Guilford & Wright	Obliterative Techniques in Mastoid & Tympanoplasty Cavities
450	Hallberg	Newer Methods of Treatment of Severe Epistaxis
452	Harkins	Routine Office Management of Allergic Patients
459	Jones, E.	External Otitis: 1961
466	Kos	Vein Plug Stapedioplasty
470	Lemon	Serous Otitis Media in Children
473	Lore	Vascular Surgery in Head & Neck
475	McNally	Labyrinthine Tests
488	Rinkel	The Diagnosis of Food Allergy
503	Skolnik	Electrodiagnosis in Facial Nerve Paralysis
514	Wallner	Surgery of Tonsils & Adenoids

Key T-2 — 10:15 a.m. to 11:15 a.m.

Course No.	SPEAKER	SUBJECT
432	Farrior, J.	Stapes Operations—1961
438	Fowler	Facial Paralysis
451	Hallberg	Sudden Deafness & Its Implications
454	Hilsinger	Vascular Headaches
463	Kelemen	Pathology of Congenital Deafness
477	Montgomery	Arthritis of Larynx
479	Pastore	The Throat: Functional Problems
486	Rawlins	The Corticosteroids in Otolaryngology
491	Rosen	Is There a Single Stapes Procedure Preferable for All Cases of Otosclerosis?
501	Shambaugh	Surgical Applications of the Mechanism of the Middle Ear
513	von Leden & Moore	Current Trends in Office Laryngology

Key T-3 — 11:30 a.m. to 12:30 p.m.

Course No.	SPEAKER	SUBJECT
404	Altmann & Waltner	Treatment of Meniere's Disease with Ultrasonic Waves
405	Anson	Developmental & Adult Anatomy of Ear & Temporal Bone in Relation to Problems of Endaural Surgery
409	Bateman	Trans-sphenoidal Hypophysectomy: Combined Septal and Ethmoidal Approach
415	Bolotow	Rhinoplasty: Recent Concepts
427	Devine	Total Laryngectomy: Anatomy & a Technique
445	Gorney	Septum Surgery in the Twisted Nose
446	Grandon	Practical Surgical Procedures
460	Jordan, R.	Meniere's Disease
461	Juers	Office Tympanic Perforation Closure
482	Proctor	Tympanoplasty
502	Shea	Fenestration of the Oval Window
507	Tabb	Closure of Tympanic Membrane Perforations with Vein Grafts
508	Tonndorf	Patho-Physiology of Bone Conduction & Its Clinical Implication
511	Trible	Minimizing Deformity in Tumor Surgery of Head & Neck

SCHEDULE OF INDIVIDUAL COURSES—OTOLARYNGOLOGY—Wednesday

Key W-1 — 9:00 a.m. to 10:00 a.m.

Course No.	SPEAKER	SUBJECT
402	Alfaro	Fullness in the Ear
406	Armstrong	Use of Vinyl Tubing in the Treatment of Chronic Secretory Otitis Media
416	Bradley	Practical Office Speech Audiometry
421	Clell	Hypnosis in Otolaryngology
424	Compere	Radiologic Examination of Mastoid, Middle Ear & Eustachian Tube
428	DeWeese	The Problem of the Dizzy Patient
436	Fitz-Hugh & McLean	Salivary Glands: Common Disorders
437	Flynn	Chronic Sinusitis
442	Goldman, I.	Correction of the Deviated Nose
444	Goodhill & Harris, I.	Stapes Surgery: Perichondral Graft
466	Kos	Vein Plug Stapedioplasty
489	Rinkel	Diagnosis of Inhalant Sensitizations
494	Scheldrup	Applied Anatomy of the Neck
495	Schlosser	Surgery of Chronic Otitis Media & Mastoiditis
498	Sellers	Headache: Otorhinologic Causes & Cure
507	Tabb	Closure of Tympanic Membrane Perforations with Vein Grafts
509	Torok	Technique of Nystagmography

Key W-2 — 10:15 a.m. to 11:15 a.m.

Course No.	SPEAKER	SUBJECT
413	Bellucci	Surgery of Stapes & Oval Window
418	Brodnitz	Nodules, Polyps & Contact Ulcer of the Larynx
443	Goldman, J.	Opportunities for Intranasal Surgery
461	Juers	Office Tympanic Perforation Closure
465	Kirchner	Facial Bone Injuries
467	Kraus & Furey	Adventures in Space
469	Lederer	Diagnostic & Therapeutic Pitfalls in ENT Practice
471	Lewy	Direct Laryngoscopy with Stability, Accuracy & Ease
480	Perlman, H.	Fluid in the Middle Ear
481	Petryshyn	The Fractured Mandible
490	Ronis	Pitfalls in Stapes Surgery
496	Schuknecht	Stapedectomy for Otosclerosis
515	Woodman	Vocal Cord Surgery

Key W-3 — 11:30 a.m. to 12:30 p.m.

Course No.	SPEAKER	SUBJECT
405	Anson	Developmental & Adult Anatomy of Ear & Temporal Bone in Relation to Problems of Endaural Surgery
412	Bell	Correction of Outstanding Ears
417	Brenman	Photography with the Operation Microscope
422	Cocke	Salivary Gland Tumors
423	Cody	Present Day Concepts in Major Sinus Surgery
425	Corgill	Radical Hypopharyngeal Surgery & Chemotherapeutic Arterial Infusion Technique
426	Derlacki, Shambaugh & Harrison	Conservative Stapes Surgery
430	Erich	Fractures of the Facial Bones
433	Farrior, R.	A Method of Otoplasty
447	Guggenheim	Technique & Pitfalls of Adenoidectomy
460	Jordan, R.	Meniere's Disease
468	Lake	Secretory Otitis Media in Children
482	Proctor	Tympanoplasty
487	Reed	Neck Dissection
500	Senturia & Adler	What's New in the Treatment of External Otitis?

SCHEDULE OF INDIVIDUAL COURSES—OTOLARYNGOLOGY—Thursday

Key Th-1 — 9:00 a.m. to 10:00 a.m.

Course No.	SPEAKER	SUBJECT
403	Alfaro	Plans for the Office
407	Atkins	Bronchoscopic Problems of Infancy & Childhood
414	Blatt	Diseases of the Salivary Glands
420	Carhart	Tests for Malingering
421	Ciell	Hypnosis in Otolaryngology
442	Goldman, I.	Correction of the Deviated Nose
448	Guilford & Wright	Obliterative Techniques in Mastoid & Tympanoplasty Cavities
455	Hough	Partial Stapedectomy
472	Loch	Septum Deviations
474	McHugh	Surgical Treatment of Traumatic Conductive Deafness & Facial Paralysis
476	Missal	Cervico-Occipital Syndrome
483	Proctor	Surgical Anatomy of Temporal Bone
484	Proud	Middle Ear Effusion
505	Spector	Dizziness
506	Sullivan, Smith & McAskile	Facial Palsies & Their Treatment
510	Torok	Evaluation of the Nystagmogram

Key Th-2 — 10:15 a.m. to 11:15 a.m.

Course No.	SPEAKER	SUBJECT
408	Austin	Tympanoplasty Utilizing Vein Graft
410	Becker	Plastic Surgery of Protruding Ears
411	Beinfield	Surgical Management of Bony Choanal Atresia of Posterior Nares
413	Bellucci	Surgery of Stapes & Oval Window
419	Brown, H.	Otologic Evaluation of the Cerebellopontine Angle Tumors
429	Dickinson	Grafts & Implants in Repair of Facial Deformities
441	Glorig	The Otolaryngologist & Hearing Aid Selection
457	Jerger	Auditory Tests in Diagnosis
469	Lederer	Diagnostic & Therapeutic Pitfalls in ENT Practice
478	Myers	The Microsurgery of Otosclerosis
492	Ryan	Headache
493	Saunders	Oral Lesions
504	Skolnik	Velo-Pharyngeal Inadequacy
512	Van Alyea	Sinusitis

Key Th-3 — 11:30 a.m. to 12:30 p.m.

Course No.	SPEAKER	SUBJECT
412	Bell	Correction of Outstanding Ears
430	Erich	Fractures of the Facial Bones
434	Farrior, R.	Cervico-Facial Congenital Anomalies
435	Feldman	Practical Solutions of Bone Conduction Audiometry
439	Friedberg	Diseases of the Esophagus
449	Guilford & Wright	Stapes Mobilization Techniques
453	Hilger	Tympanomastoid Surgery with Posterior Musculoplasty
456	House, H.	Stapes Mobilization Procedure
458	Johnson, F.	Tonsillectomy & Adenoidectomy Surgery
462	Kastein	Appraisal & Management of a Child with Audiological Problems
468	Lake	Secretory Otitis Media in Children
485	Rabbett	Submucous Resection of the Nasal Septum
497	Schuknecht	Removal & Preparation of the Human Temporal Bone
499	Sellers	Dizziness

LISTING OF AUDIOMETERS

The following audiometers are recommended for listing by a subcommittee of the Committee on Conservation of Hearing, American Academy of Ophthalmology and Otolaryngology:

PURE TONE AUDIOMETERS

Beltone Model 10-C Model 15-C	Beltone Hearing Aid Company Audiometer Division 2900 West 36th Street Chicago 32, Illinois
Maico Model MA-5 Model H1-B for pure tones only	Maico Electronics Inc. Maico Building 21 North Third Street Minneapolis 1, Minnesota
Sonotone Model 91	Sonotone Corporation Elmsford, New York
Zenith ZA 200	Zenith Radio Corporation 6501 West Grand Avenue Chicago 35, Illinois

SPEECH AUDIOMETERS

Grayson-Stadler Model 162	Grayson-Stadler Co. West Concord, Massachusetts

SCREENING AUDIOMETERS

Ambco Otometer 600	Ambco Inc. 1222 W. Washington Blvd. Los Angeles 7, California

Each model number in the list as a rule indicates the most advanced model of that series. If less advanced instruments are for sale under similar model numbers, it is assumed that they will function as well or better than the more complicated model in a series.

Acceptance for listing means that the audiometer manufacturer has demonstrated the ability to produce one instrument that performs according to A.S.A. specification. It does not imply that any individual instrument will perform within the tolerances. It is obviqusly beyond the scope of the Listing Committee or the Referee Laboratories to provide production control for audiometer manufacturers and their customers; however, listing does indicate that the product of the manufacturer can come up to 1951 A.S.A. specifications, and it is up to the customer to carry on negotiation with the manufacturer if a particular instrument which he receives is faulty.

Abatron D-100 and Ambco Oto-chek 800 were removed from the above list at the request of the respective manufacturers.

BOOK REVIEWS

CLEFT LIP AND PALATE REHABILITATION. By William H. Olin, D.D.S. Springfield, Charles C Thomas, 1960; 194 pp. 225 photographs and over 70 illustrations. Index.

This book is a résumé of the background which the author has acquired through his vast experience in the management of cleft lip and palate patients. As stated in the preface, "Over the past several years, I have received many inquiries regarding the various techniques used in our clinic for the treatment of patients with clefts. I have therefore accumulated the material for this monograph in the hopes that it may aid others working with cleft lip and palate patients."

An introductory general considerations section is concerned with the historical background, incidence, etiology, and classification of cleft entities. Feeding problems of children with cleft lip and palate are discussed. Primary and secondary surgical procedures commonly used in the repair of cleft lips and palates are presented in a surgery chapter with excellent illustrations.

The author has collaborated with Duane Spriestersbach, a speech pathologist well known for his work with cleft palate patients, to present a section dealing with oral structures as a speech mechanism. Emphasized is the thought that not all speech defects are due to faulty oral structures. Improving the condition of the oral structure alone may not result in immediate improvement, since speech is a learned behavior.

The text material is of interest to all professions associated with the treatment of cleft lip and palate. However more than half of the book is devoted to dental aspects of rehabilitation, particularly orthodontics and prosthodontics. The orthodontic section includes brief case reports of 17 cleft palate patients with varying degrees of malocclusion. Discussed are such problems as collapsed jaw segments, cross-bites, and vertical dimension commonly seen in these patients. Introductory pages in this chapter include the author's basic procedure for treating the typical cleft palate malocclusion.

The chapter devoted to cleft palate prosthesis contains a résumé of the treatment sequence in 14 cases. The spectrum of prosthodontics ranges from prostheses for young cleft patients with deciduous or mixed dentition to those for the completely edentulous individual. Rationale for the prostheses is discussed. As in the orthodontic section, Doctor Olin's mode of procedure is outlined.

Interwoven in the contents of this book is a philosophy which alludes to the group approach in treating patients with cleft lip and palate. The rationale and technique methods which are presented are not elaborate and complicated. Rather the relatively simple, concise approach to oftentimes complex situations seems to have proven rewarding for the cleft palate program which the author has so ably fostered and described.

W.R.L.

THE STRUCTURE OF THE EYE. Edited by George K. Smelser. (Proceedings of the Symposium held during the Seventh International Congress of Anatomists, New York. 50 contributions.) New York and London, Academic Press, 1961. Illustrated with photographs of microslides made with

the electron microscope, diagrams and drawings. 556 pp. $15.00.

Much of the research in anatomy and physiology of the eye is done in anatomical laboratories by modern scientific techniques and methods that are original or adaptations of previously known methods. The newer instruments in the field of electronics make possible the visualization of physiological processes and measurements of structures and processes not achieved by any other means. The easily accessible eye with its unusual transparent walls affords visualization of in vivo blood vessels for study of circulation and the effects of means of altering the rate and volume of blood flow.

The minute structure of the rods and cones and the intimate relationship of nerve cells and fibers as revealed by electron microscopy leads to speculation where facts cannot be demonstrated. The presence of centrifugal fibers in the optic nerve is clearly shown by photographs if the interpretation of swollen nerve fiber ends is correct by analogy. The study of lens epithelium has been comparatively unproductive though the bloodless cornea and lens cortex are first choice tissues for the study of metabolic changes, natural and induced. This is not a textbook. It is a reference work for teachers and research students and for ophthalmologists who have a yen to keep up to date on the scientific advances in the biological sciences.

W.L.B.

YOU AND YOUR EYES: by Lawrence Lewison, New York, Trinity Publishing Co., Cloth, p. 253, Price, $3.50.

This book written in nontechnical language for the lay reader is obviously intended to inform the public about the advantages of wearing contact lenses. The use of glasses to improve visual acuity is touched upon as an economic, social and psychologic crutch that is tolerated by most wearers for lack of something better. "Not one wearer of eye glasses would continue to wear them if he had an alternative means of vision correction." That something is contact glasses. Just as there were improvements in spectacles over a span of more than one hundred years there has been a remarkably rapid improvement in the design of contact glasses to the present vent-air type which can be made precisely to specifications assuring comfortable wearing with no hazards to the eye. Fears and apprehensions about damage to the eye in fitting and wearing contact glasses is resolved by the "findings confirmed by psychological and motivation studies: The innate fear of putting something 'into' or near the eye can be dispelled by enlightenment. . . . Once fear and ignorance are removed, the alternative means of vision correction—particularly contact lenses, present other advantages apart from the psychological ones."

The nature of refraction defects in the eye are explained and illustrated with diagrams. The methods of correction of vision deficiencies by optical aids are briefly described. Many of the questions put to practitioners in the field of ophthalmic optics are satisfactorily answered—and new questions proposed. A book a doctor may want to suggest for his patient.

W.L.B.

THE EYE IN GENERAL PRACTICE. By C. R. S. Jackson, M.A., B.M., B.Ch. (Oxom.) D.O.M.S., F.R.C.S. Second Edition. Edinburgh and London, E. & S. Livingstone Ltd., 1960. Distributed by the Williams and Wilkins Company, Baltimore. Board. 148 pp., 25 il. (several in color), index. $5.00.

A previous edition released in 1957 has been revised and extended to include new developments in diseases of the eye of interest to the general practitioner. This small but comprehensive volume is written to meet the minimum requirements of the general practitioner of the United Kingdom to describe the common diseases of the eye, indicate the ways in which dangerous diseases of the eye may be recognized, and to show the reasons for seeking the advice of a specialist.

In comparison with a number of similar books available to the general practitioner it is distinctly elementary. No part is beyond what most recently graduated practitioners will remember from their medical school and internship. Individual diagnostic entities are described but no comment of differential diagnosis is added. Remarks on treatment are properly restricted but ample for emergency purposes. The most extended chapter is on squint which is a problem of little concern to the general practitioner outside of its significance in locating the site of the injury in acquired cases. Nurses and ophthalmic assistants may very well profit by keeping this well conceived and lucidly written volume at hand for ready reference.

W.L.B.

POST-OPERATIVE CATARACT SPECTACLE LENSES. By Robert C. Welsh, M.D. Miami, Fla., The Miami Education Press; Loose leaf, plastic bound, illustrated with line drawings; 122 pp.; table of contents and glossary of abbreviations.

Designed to present in a single volume a comprehensive service for aphakic eyes "for the Eye Surgeon, the Refractionist, the Ophthalmic Dispenser, the Surfacing and the Manufacturing Laboratories, and the Ophthalmic Lens Designers." The book contains chapters on pathological physiology of spectacle lens corrected aphakic vision, a study of optimum base curves of cataract spectacles, the types of cataract lenses available and the technique of making and fitting aphakic spectacles and contact lenses.

W.L.B.

NEURAL MECHANISMS OF THE AUDITORY AND VESTIBULAR SYSTEMS. Edited by Grant L. Rasmussen and Wm. F. Windle. Springfield, Charles C Thomas, 1961. 422 pp., Bibliography and Index. $15.75.

This constitutes a source book for the basic mechanism of the mechanical and electrochemical physiology of the organ of Corti and its central connections. It contains most of the pertinent information obtained by the most competent observers in America and abroad, condensed and correlated, almost up to the minute of publication. Its extensive bibliography covers the recent literature completely and the index is adequate.

It is a "must" for any institution where the physiology of hearing is being seriously considered or for any otologist who wishes to keep abreast of developments in this field. It should also be useful and informative for the student of neuronal activity in any field.

H.L.W.

NEWS AND ANNOUNCEMENTS

LESLIE DANA MEDAL

The selection of Frederick C. Cordes, M.D., for the 1960 Award of the Leslie Dana Medal was announced by the executive committee of the National Society for the Prevention of Blindness and the St. Louis Society for the Blind.

Doctor Cordes is Chairman of the Department of Ophthalmology at California University Medical Center and Civilian Consultant in Ophthalmology to the Surgeon General, U. S. Army and U. S. Navy. He is a Fellow of the American College of Surgeons; a member of the Board of Regents; a member of the National Research Council on Ophthalmology; a trustee of the Heed Ophthalmological Foundation; associate chief examiner for the National Board of Medical Examiners; former chairman of the American Board of Ophthalmology; former president of the Council of the American Ophthalmological Society; former president of American Academy of Ophthalmology and Otolaryngology, and former president of Pacific Coast Oto-Ophthalmological Society. He was vice-president of the Pan-American Association of Ophthalmology from 1943 to 1960.

Doctor Cordes is an associate editor of the American Journal of Ophthalmology and has served on the editorial board of the Archives of Ophthalmology. He was a member of the board of directors of the National Society for the Prevention of Blindness from 1955 to 1960 and is co-chairman of the professional advisory committee of the California Society for the Prevention of Blindess, a division of the NSPB.

EDWARD LORENZO HOLMES MEMORIAL AWARD

At a joint meeting of the Institute of Medicine of Chicago and the Chicago Ophthalmological Society on Saturday, May 20, the Fifth Edward Lorenzo Holmes Memorial Lecture of the Institute of Medicine of Chicago was given by Lorenz E. Zimmerman, M.D. His lecture was entitled "Acid Mucopolysaccharides in Ocular Histology and Pathology."

Presentation of the Edward Lorenzo Holmes Citation and Award to Doctor Zimmerman was made by Dr. Louis N. Katz, president of the Institute of Medicine of Chicago.

Doctor Zimmerman is Chief of Ophthalmic Pathology Branch and Registrar, Registry of Ophthalmic Pathology, Armed Forces Institute of Pathology, Washington, D. C. He has been a vigorous and prolific scientist. He has contributed to our understanding of diseases of the cornea, the nature of the defect in glaucoma, and the ocular abnormalities arising from a variety of infections. Doctor Zimmerman has critically and patiently applied histochemical techniques to ocular diseases and opened new avenues of information. He has conscientiously trained others in his techniques, and has contributed much to scientific knowledge and education through extensive writing and lecturing.

AMERICAN SPEECH AND HEARING ASSOCIATION

At the recent Thirty-Sixth Annual Meeting of the American Speech and Hearing Association, Hans von Leden, M.D., and Paul Moore, Ph.D., of Northwestern University received the First Award of the American Speech and Hearing Association for their investigation of arytenoid motion.

At the Fifth International Exhibition of the Scientific-Didactic Film, Doctors von Leden and Moore received the "Bucranio" for their work on the physiology of the pathologic larynx.

EXAMINATION FOR ORTHOPTIC TECHNICIANS

The annual examination of orthoptic technicians by the American Orthoptic Council will be conducted in August and October, 1961.

The written examination will be non-assembled and will take place on Thursday, August 24, in certain assigned cities and offices, and will be proctored by designated ophthalmologists.

The oral and practical examinations will be on Saturday, October 7, in Chicago just preceding the meeting of the American Academy of Ophthalmology and Otolaryngology.

Application for examination will be received by the office of the Chairman of the Examining Committee, Frank D. Costenbader, M.D., 1605 22nd Street N. W., Washington 8, D. C., and must be accompanied by an examination fee of $30.00. Applications will not be accepted after July 1, 1961.

NOTICE

The National Society for the Prevention of Blindness will move to a new home within New York City during the summer months.

Negotiations have been completed for the relocation of national offices from 1790 Broadway to larger quarters at 16 East 40th Street. The target date for occupying the new building is June 1.

FALL MEETING

The joint annual meeting of the North Carolina Eye, Ear, Nose and Throat Society and the South Carolina Society of Ophthalmology and Otolaryngology will be held at the Francis Marion Hotel, Charleston, South Carolina, September 11 and 12, 1961. An excellent program has been arranged. Guest speakers include three ophthalmologists and three otolaryngologists. There will be entertainment features for both the physicians and ladies.

CENTRAL ILLINOIS SOCIETY OPHTHALMOLOGY AND OTOLARYNGOLOGY

The Thirty-Sixth Convention of the Central Illinois Society of Ophthalmology and Otolaryngology was held April 21 to 23, 1961, in Springfield, Illinois. Speakers included Dr. John J. Shea, Jr., Dr. Arthur Jampolsky, and Dr. William H. Weiss. A motion picture on "Enzymatic Zonulolysis" prepared by Dr. Karl Hruby of Graz, Austria, was presented. Special non-medical presentations were given by Dr. and Mrs. S. G. Baldwin and Dr. Demitri B. Shimkin.

INTERNATIONAL SYMPOSIUM ON AUDIOSURGERY

An International Symposium on Audiosurgery will be held in Madrid August 2 to 4, 1961. The following subjects will be discussed: (1) Congenital Defects of the Ear; (2) Suppurative Processes of the Ear and Its Sequelae; (3) Otosclerosis, and (4) Surgery of the Peripheral Facial Nerve. For further information please write to Dr. Alfredo Juderias, Secretaria General, Pabellon n.° 8, Ciudad Universitaria o Calle O'Donnell, 37, Madrid.

PACIFIC COAST OTO-OPHTHALMOLOGICAL SOCIETY

The Pacific Coast Oto-Ophthalmological Society held its annual meeting in Palm Springs, California, April 30 to May 4, 1961. The following invited speakers participated in the program: Carl-Axel Hamberger, M.D., Stockholm, Sweden; Francis Heed Adler, M.D., Philadelphia; Meyer Friedman, M.D., San Francisco; Howard B. Sprague, M.D., Brookline, Mass.; Robert D. Sullivan, M.D., New York, and David F. Austin, M.D., Memphis, Tenn.

GILL MEMORIAL EYE, EAR AND THROAT HOSPITAL

The Gill Memorial Eye, Ear and Throat Hospital has just completed its Thirty-fourth Annual Spring Congress in Ophthalmology and Otolaryngology and allied specialities. A total of nineteen guest speakers presented fifty-two lectures during the week-long course.

In 1962, the Thirty-Fifth Annual Spring Congress will be held April 2 through April 7. For further information please write to E. G. Gill, M.D., Gill Memorial Eye, Ear and Throat Hospital, Roanoke, Virginia.

ASSOCIATION FOR RESEARCH IN OPHTHALMOLOGY

The midwinter meeting of the Association for Research in Ophthalmology will

meet at the Statler Hotel, Detroit, Michigan, December 3 to 6, 1961. Abstracts of papers to be presented at this meeting must be submitted before August 1 to Frank W. Newell, M.D., Chairman of Program Committee, University of Chicago, 950 East 59th Street, Chicago 37. One original and two carbon copies of papers accepted for the program must be submitted by October 1 to Bernard C. Becker, M.D., Chairman of the Editorial Committee, 640 South Kingshighway Boulevard, St. Louis 10.

INTERNATIONAL ASSOCIATION OF LOGOPEDICS AND PHONIATRICS

The XII Congress of the International Association of Logopedics and Phoniatrics will take place in Padua from August 29 to September 4, 1962. The following official reports will be presented:

Modern Research on Experimental Phoniatrics
Jw. Van den Berg, Ph.D., Groningen

Functional Dysphonia
J. Perello, M.D., Barcelona

Diagnostic Procedures in Auditory Disorders of Children
L. M. DiCarlo, D. Ed., Syracuse, U. S. A.

For further information please write to Congress Secretary: Caterina Croatto-Martinolli, M.D., Centro Medico-Chirurgico di Foniatria, Via Bergamo, 10, Padova, Italy.

INTERNATIONAL BRONCHOESOPHAGOLOGICAL SOCIETY

PAN AMERICAN ASSOCIATION OF OTO-RHINO-LARYNGOLOGY AND BRONCHO-ESOPHAGOLOGY

The Tenth International Congress of Bronchoesophagology will meet in Reims, France, and Dusseldorf, Germany, July 30 to August 2, 1961.

The Eighth Pan American Congress of Oto-Rhino-Laryngology and Broncho-Esophagology will meet in Puerto Azul, Venezuela, February 25 to March 1, 1962.

For further information concerning these meetings, please write to Dr. Charles M. Norris, 3401 North Broad Street, Philadelphia 40.

NEW YORK EYE AND EAR INFIRMARY

The Fourth Series of Post-Graduate Courses for Specialists in Ophthalmology will be given from September 14 to November 15, 1961. The Courses will include the following: Advances in Ocular Prostheses; Anomalies of Extraocular Muscles, including Ptosis; Biomicroscopy; Biomicroscopy, Using Near Ultra-Violet, Cobalt Blue, Polarized Light and Infra-Red Lights; Clinical Bacteriology; Clinical Problems of Tear Formation; Complications of Ophthalmologic Surgery; Contact Lenses; Electrophysiology and Applied Physiology of the Eye; Enucleation and Evisceration; Glaucoma; Gonioscopy; Keratectomies and Keratoplasties; Lacrimal Sac Surgery; Light Coagulation (Meyer-Schwickerath Apparatus); Low Vision Aids; Ocular Biochemistry; Ocular Geriatrics; Ocular Neuro-Ophthalmology; Ocular Photography; Ocular Radiology; Ocular Therapeutics; Ophthalmoscopy; Orthoptics; Pathology; Pediatric Ophthalmology; Perimetry; Physiological Optics; Plastic Eye Surgery; Pleoptics and Macular Function Testing; Psychosomatic Factors in Ophthalmology; Radio-Isotopes in Ophthalmology; Recent Advances in Cataract Surgery; Refraction; Retinal Detachment; Surgery of the Orbit; Tonography, and Uveitis.

For catalog and additional information, please write to Mrs. Tamar Weber, Registrar, Institute of Ophthalmology of the Americas, New York Eye and Ear Infirmary, 218 Second Avenue, New York 3.

INSTITUTE ON OCCUPATIONAL HEARING LOSS

This course is designed to train physicians interested in the problem of occupational hearing loss, and to train nurses, plant engineers and others in initiating and conducting hearing conservation programs in noisy industries. The curriculum includes discussion of the causes of occupational deafness, but is primarily con-

cerned with its prevention. In order to allow for maximum individual instruction, course enrollment is limited. The diversity of experience of the faculty members, assembled especially for this course, provides an unusual opportunity for personal consultation on any aspect of occupational hearing loss.

The dates of the course are August 14 to 19 and the fee of $200 includes tuition, board and room. Requests for further information should be made to William A. Macomber, Colby College, Waterville, Maine.

WAYNE STATE UNIVERSITY POSTGRADUATE COURSE

The Department of Ophthalmology of Wayne State University College of Medicine will give a nine months' training course in basic ophthalmology beginning September 18, 1961.

Six mornings a week will be spent in lectures and laboratories. Each afternoon students will be assigned to eye clinics of affiliated hospitals. A fundus clinic will be held weekly; also one on muscles.

Students are to be given 120 hours of training in physiologic optics, 122 hours in histology and pathology, 60 hours in biochemistry, 40 hours in neuroanatomy, etc.

Tuition is $300. Brochures on the basic sciences course will be mailed upon request. For further information write to A. D. Ruedemann, M.D., Chairman, Department of Ophthalmology, 690 Mullett St., Detroit 26.

COLORADO

The Colorado Ophthalmological Society, the Division of Ophthalmology of the Department of Surgery and the Office of Postgraduate Medical Education of the University of Colorado School of Medicine are co-sponsoring a postgraduate course in ophthalmology to be held in conjunction with the summer convention of the Colorado Ophthalmological Society at Estes Park, Colorado.

Guest speakers will include Raynold N. Berke, M.D., New York; Frederick C. Blodi, M.D., Iowa City; Ramon Castroviejo, M.D., New York, and Frank W. Newell, M.D., Chicago.

For further information please write to Office of Postgraduate Medical Education, University of Colorado Medical Center, 4200 East Ninth Avenue, Denver 20.

RETINA FOUNDATION

Clinical Research Fellowships of the Retina Foundation will be expanded upon completion of the Foundation's research building at the end of 1961. The training program includes concentrated work in general fundus diagnosis by indirect stereoscopic ophthalmoscopy, and in retinal detachment surgery. Many opportunities and special training are available in various phases of clinical research. Details about one-year and two-year programs will be sent on request. Fellows not supported by other research or training grants receive adequate stipend.

Graduates of medical schools outside the United States and Canada must complete the requirements of the Educational Council for Foreign Medical Graduates to engage in clinical activities. Inquiries and applications should be addressed to Dr. Robert J. Brockhurst, 99 West Cedar Street, Boston 14, Massachusetts.

POSITIONS AVAILABLE

OPHTHALMOLOGIST wanted. Fully equipped office and established practice of recently deceased ophthalmologist for sale. Town of 90,000 with a drawing community population of over two million. For further information, please write Mr. Roy H. Bland, 1211 South Sixth Street, Springfield, Ill.

OPHTHALMOLOGIST wanted. Board qualified for group practice in clinic associated with 65 bed accredited hospital. Starting salary $15,000 with additional attractive benefits, progressive pay scale. For details, write Donald S. Lehman, M.D., Medical Director, Community Hospital-Clinic, Elk City, Oklahoma.

OPHTHALMOLOGIST wanted. Board-certified or Board eligible. To settle in Colorado Springs. Send credentials to Kenneth E. Gloss, 2808 West Colorado Ave., Colorado Springs.

EXCELLENT OPPORTUNITY for E.E.N.T. specialist to take over active practice in Los Angeles Must be Board certified or eligible. Complete, modern equipment For further information, please write Edwin Cobb, M.D., 1680 North Vine Street, Los Angeles 28.

OTOLARYNGOLOGIST desires a group-type practice position with academic and teaching affiliation. Any location will be considered. Age 37, Diplomate, F.A.C.S. Eight years of hospital and private practice—3 years departmental chief. For further information, please write M. M. Mackay, M.D., Department of Otolaryngology, C. & O. Hospital, Clifton Forge, Va.

UNEXPECTED VACANCIES—Approved First and Third Year Residencies in Otolaryngology beginning July 1, 1961. Stipends $200 and $250 respectively per month with full maintenance and training program. Apply: Superintendent, Baltimore Eye, Ear and Throat Hospital, Baltimore 17, Maryland.

Listings of positions available should be sent to W. L. Benedict, M.D., 15 Second Street S. W., Rochester, Minn., by the fifth of the month preceding publication. They should include (1) type of physician wanted (ophthalmologist or otolaryngologist: diplomate, resident, etc.) (2) type of position to be filled; and (3) to whom to write for further information. Unless otherwise requested, listings will be published only once.

The Academy will handle no further correspondence beyond the listing and assume no responsibility. Neither does it endorse nor guarantee any of the published listings.

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Phenylephrine HCl	*0.12%*
Methylcellulose	*0.12%*

DOSAGE: *1-2 drops in the conjunctival sac two to four times daily. During the initial 24-48 hours the dosage may be safely increased to 2 drops every hour.*

SUPPLY: *In 5 cc. plastic dropper bottles — on prescription only.*

UNSURPASSED POTENCY FOR OCULAR INFLAMMATIONS BEYOND THE CONTROL OF ORDINARY STEROID STRENGTHS

ALLERGAN PHARMACEUTICALS *Los Angeles 17, California*